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INTERIM EFFLUENT GUIDANCE FOR NPDES PERMITS

Robert B. Schaffer

Environmental Protection Agency
Washington, D. C.

1973

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INTERIM EFFLUENT GUIDANCE

FOR NPDES PERMITS

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OFFICE OF PERMIT PROGRAMS

U. S. ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D. C. 20460

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
ENFORCEMENT AND GENERAL COUNSEL

MEMORANDUM

TO : All Regional Permit Program Directors

FROM : Office of Permit Programs, Washington, D. C.

SUBJECT : Updated Effluent Guidance Materials

The attached guidance package consists of two parts:

1. Instruction and limitations which apply to permit applications in all industrial categories. In general this is the guidance you received in our January 2, 1973, memorandum; there have been some additions and deletions.

2. Updated and streamlined guidance documents in a standardized format, to replace the guidance documents which you received at intervals since June 1972. Previous effluent guidance documents are superceded. Explanatory data and references have been deleted and will be made available in separate back-up documents. Sampling and monitoring instructions also have been deleted. Specific guidance for monitoring and self reporting has been provided in draft form 3/9/73.

The Effluent Guidelines Division, Office of Air and Water Programs and the Permit Program Staff, Office of Enforcement and General Counsel, have reviewed the effluent guidance documents and have concurred in the technical applicability of these documents for interim use in the issuance of permits under Section 402, until effluent guidelines are promulgated under Section 304, but only within the limitations set forth in the Deputy Administrator's memo of February 28, 1973, which has been cited in each case in the guidance under the title "Application of Limitations".

As pointed out in our memo of January 2, 1973, this guidance applies primarily to major or significant dischargers. Considerable care and discretion must be used in the application of this guidance to minor or less significant discharges.

There may be individual cases outside the areas indicated below where a determination of best practicable control technology currently available for the industrial facility in question can be made with a high degree of confidence, through reliance on the interim effluent guidance together with an evaluation of the particular conditions in existence at the facility. Decisions to issue permits in such cases should be made with caution and on a limited basis. Subject to the foregoing, the following guidance documents may be used in accordance with the caveats and qualifications cited.

Robert B. Schaffer

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General Effluent Guidance for All
Industrial Categories

The following guidance on special technical considerations in the application of limitations, and on effluent limitations for specific parameters, is to be used as appropriate in writing permits for applications in all industrial categories.

General

The guidance documents were developed to cover, as specifically as possible, the identified industrial categories. The numbers previously developed and the information contained herein were meant to apply generally to the industrial category but more specifically to "major", "large", or more significant dischargers. Additional information on other considerations (i.e., economic, age) will be forthcoming. This should not materially effect your priorities. However, should a problem arise that requires additional consideration, please contact the appropriate headquarters individual. You will find, as you probably already have, that the guidance does not lend itself to all situations involving "special" problems of age and economic impact, etc., for a given category.

pH

The normal range in which all discharges should fall is generally accepted to be between a pH of 6 and a pH of 9. Any discharge outside of this range should be well justified and should consider such things as the addition of total dissolved solids from neutralization and the buffering capacity of the receiving water. If the pH of the discharge is significantly different than the pH of the receiving water within the 6.0 to 9.0 range and the discharge is a significant portion of the receiving water, toxic effects due to pH fluctuations within this range can be shown. Therefore, it is imperative that the discharge be evaluated carefully even within the range of 6.0 to 9.0, (e.g., 7.0 ± 0.5).

Coliform

This is a significant parameter for mixtures of industrial wastewater and sewage and may be significant for certain industrial wastewaters alone. Because of the sewering of most plants, the absence of sewage should be established by dye test. If sewage is present, the following effluent limit should be imposed:

> "Organisms isolated in the fecal coliform test shall not exceed 1000 organisms per 100 ml."

Total Dissolved Solids

Total dissolved solids have not been limited in the individual guidance documents. There is technology available for the removal of total dissolved solids when receiving water quality so dictates.

Oil and Grease

Permit conditions for petroleum-based Oil and Grease, based on the Standard Methods (13th Edition, Method 137) are to reflect an achievable concentration of 10 mg/l as the basis for determining limitations.

This limitation should be imposed where appropriate across industrial categories. If petroleum-based oil and grease is not present in the characteristic discharge, the limitation may be eliminated. Oil and grease analysis may also be used to detect oily materials of animal and vegetable origin. The limitation of oil and grease in these instances should be applied with caution. Vegetable or animal based oil and grease is generally less significant than petroleum based oil and grease at the same levels.

Toxicity

National standards for toxicity limitations via bioassay procedures have not been set. Certain States require bioassay procedures which will be incorporated in our discharge permits when those states include the requirement as part of certification under Section 401. A list of toxic substances and standards will be promulgated under Section 307 of the Act.

Heavy Metals

A general limitation of 1 mg/l maximum total dissolved heavy metals should not be imposed across the board. The figure is, however a good point of reference when establishing limits for a discharge involving a number of dissolved heavy metals which could present a hazard to water quality due to synergistic toxic effects.

Utility Discharges, Thermal Energy

For practical purposes, thermal limitations are most significant when applied to once through non-process contact cooling water, and treated effluent. This includes both manufacturing industry and power generating industry.

The industrial effluent limitation guidance addresses "process wastewaters" only, which have come into intimate contact with raw material, products, byproducts, etc., and include all wastewaters containing significant amounts of non-thermal pollutants. Typically, these streams require biological or physical treatment to reduce the content of specific constituents. When the resulting "treated effluent" contains thermal energy, additional considerations and limitations may be necessary.

Included in this definition of "process wastewaters" are cooling tower blowdown, boiler water blowdown, water treatment plant backwashings and once through process contact (e.g., barometric condenser) cooling water. However, limitations to be applied to constituents of these components of "process waters" are generally not contained in existing guidance.

Relative to pollutant reduction in utility water components of "process wastewaters", each case should be evaluated individually. Further definition of "best practicable control technology currently available" in this area has been undertaken by contract studies under Effluent Guidelines Division of Office of Water Programs.

The combination of cooling water and treated process water effluent prior to introduction into the receiving water is permissible. In instances where monitoring of the combined flows will not provide adequate information because of a concentration below a detectable limit, monitoring may be required prior to the combination of process flows and non-contact cooling water flows. Where once through non-contact cooling water is collected with process wastewaters in combined sewers, no allowance may be given that would condone the dilution of the plant raw waste load and result in a higher pollutant discharges allowance.

Once-through cooling water that does not come into contact with process material (shell and tube heat exchangers) discharging into segregated sewers may be excluded from the accounting of pollutants (excepting thermal) limited in the permit where source of water is the receiving stream. In such cases, thermal considerations should be applied taking into account applicable Water Quality Standards and using the guidance afforded in the Thermal Technical Manual forwarded earlier in draft form. Monitoring for possible contamination should be required, especially where saline cooling water is used. Due to the corrosive properties of saline water, corrosion products may be significant. The logic for excluding once through non-contact cooling water from pollutant limitation accounting is based upon net/gross considerations relative to influent constituents, and upon the 'practicability' of treatment to reduce very low pollutant levels":

Typically large quantities of water relative to process leakage result in concentrations not appreciably higher than supply water characteristics, and so low as to produce dubious analytical results.

Unless a specific violation of Water Quality Standards results, such low concentrations would not ordinarily be expected to have a significant or adverse impact on the receiving water.

In the absence of adverse impact (i.e., violation of Water Quality Standards) on the receiving water, the benefit of treating such large quantities of water (especially for net pollutant reduction) does not justify the cost.

Color

Color is generally an aesthetic problem. Where a specific problem is evident, limitations may be set on a case-by-case basis based upon receiving water quality.

Net and Gross

Generally a discharger is not responsible for pollutants entering with his water supply if he takes water from the same source into which he is discharging. If his source is other than the receiving stream, he is to be charged with the gross discharge.

Unless industry specifically requests application of net considerations in writing, or unless the difference between net and gross is of major significance to a discharger, the permit should be written on a gross basis with no stipulation for influent values. Where the differences between net and gross application of effluent guidance is of relatively minor significance but industry requests application of net values, the supply water waste loading should be stipulated based on presentation of existing data (i.e., adjust limitation accordingly and write permit in gross terms.) Limitations that are established for materials that are normally expected to be "concentration controlled" (e.g., TSS and BOD) may not need total credit for influent levels (a well designed clarifier will generally produce a quality effluent - 20 mg/l ss - regardless of source of suspended solids). Where application of net values is of great significance to the dischargers, permit requirements for sampling the influent wasteloadings must be included.

Pollutants that are removed in the treatment of water in an industrial facility (e.g., silt removal, filter backwash) may not be returned to the receiving water. Once a pollutant is removed by the discharger it may not be reintroduced. In this situation net/gross considerations will be applied downstream of any pretreatment steps.

Disposal of Pollutants into Wells

If an applicant for a permit proposes to dispose of pollutants into wells as part of a program to meet the proposed terms of a permit, additional terms and conditions should be specified in the permit which either prohibit the proposed disposal or control the disposal so as to prevent pollution of ground and surface waters and to protect the public health and welfare. The Administrator's decision statement number five, February 6, 1973, "Environmental Protection Agency Policy on Subsurface Emplacement of Fluids by Well Injection" should be consulted and complied with.

Standard Conditions

The provided standard permit conditions will be included in each permit in the order and language given. Additional conditions necessary to meet state certification requirements will follow the standard special conditions in the permit. State requirements which exceed national requirements will generally be adopted for National Pollutant Discharge Elimination System permits written for discharges in the State. Please note, however, that only those State requirements included in the certification (Sec. 401 of the Act) must be adopted. Recommendations can be accepted for cause. In this manner, terms and conditions of dubious legal or technical validity, or that would tend to impede enforcement may possibly be screened out.

Limitations

Permits are to be written with limitations in terms of kilograms (pounds) of each pollutant per day excepting in certain industries (such as mining operations and utility discharges) where wastewater generation is not related to production levels. The monthly operating average effluent limitation, in kilograms (pounds) per day, should be calculated using the production basis multiplied by the appropriate effluent level as specified in the guidance. It is not our intent to specifically limit water use in the permit unless the flow is so high as to cause a scouring problem in the receiving water. Once a permit has been issued based on the use of effluent volume, production levels, and attainable abatement technology, the discharger may meet his requirement via any combination of effluent volume and concentration providing he does not violate water quality standards in so doing. If a discharger drastically reduces his water usage he may augment receiving water diffusion capacity to prevent localized toxic effects or take advantage of improved treatability to reduce pollutant discharge, at his option, within the life of the permit.

The basis for limitations shall be:

1. Monthly average, expressed in kilograms (pounds) of pollutant per day which is the total of each pollutant discharged in a calendar month divided by the number of days the production facility operated that month.

2. Daily maximum, expressed in kilograms (pounds) per day.

Maximum daily limitations have not been statistically established for all industrial categories. It is our intent that the discharge limitations developed from the guidance and other considerations be a monthly operating average and a daily maximum. Variations from this operating average will be monitored and used as a basis for judgment of the performance of the discharger and to establish statistical variability. When statistically reliable data is available, a maximum variation will be established on that basis. Until such is the case, a general limitation for individual composite data shall be established that is no more than 3 times the average limitation (200% over) where water quality considerations do not prevail. Discharges may be limited singly or as a group or a combination of single discharges and groups or totally for the plant depending on the engineering judgment of the reviewer. It may be necessary to know the source of each discharge before making such a judgment. In any case, the total allowance of pollutant limitations should not exceed that calculated for the total plant production capability. Monitoring programs and compliance schedules should be consistent with approach chosen.

Production Figures to be Used in Permit Writing

A manufacturer should not be limited to less than full utilization of actual installed production capability. However, do not allow the purpose of effluent limitations to be circumvented by overstatements of production capability. The manufacturer is responsible for meeting the permit requirements without regard to seasonal variations in treatment efficiency, production levels, or product mix.

Therefore, the "production" figure can be either product or raw material as appropriate; shall be based on plant production capability whether by engineering evaluation or production history; and shall be based on the normal equipment operating schedule.

Where production units are separated, but utilize a common treatment facility, production will be evaluated for the production complex as a whole. One permit would be written for the production complex, covering all discharges to receiving water individually or combined as appropriate.

Where "production" is based on product, the total produced (including that shipped out of plant and/or placed in inventory) will be used. Similarly, where raw material (not including process chemicals) usage is the basis, the total processed will be used. In either case, assume a reasonable product mix which most fully utilizes installed equipment.

For complex facilities, the capacity will be limited by the unit process which controls production, e.g., if an intermediate process can only supply 75 units to a downstream operation with a capability of 100 units, then the overall capability is 75 units unless purchased intermediate material is introduced. The determination, further, should be based on a normal operating schedule, e.g., shifts per week. There may be cases where increased production requirements are anticipated, and will be met by a heavier operating schedule (running the equipment more shifts per week). The heavier operating schedule may be used in defining plant capacity, but should be supported by market projections, production schedules, etc., that demonstrate the intent.

The production figure arrived at in this manner should not be an unreasonable deviation from historical actual production.

In any event, the manufacturer can apply for re-issuance of his permit based on increased production. As a rule-of-thumb, this should only be necessary when the contemplated production increase would cause overloading of treatment facilities, resulting in violation of the effluent limitations in the permit.

Level A and Level B

Minimum levels of treatment (B Level) were originally proposed in recognition of the economic hardship implicit in redirecting a pollution abatement program already under construction. However, setting specific minimum limitations for all industry raised the possibility of an implied benefit to dischargers only recently providing treatment. In addition, subsequent amplification of "best practicable control technology currently available" requires consideration of economic cost benefit relationships, as well as engineering aspects, non-water quality oriented environmental impact and others.

The primary mechanism of relief will be reflected in compliance schedules terminating with acheivement of Level A guidance by July 1, 1977. The most important consideration in using Level A and Level B is to remind the discharger that Level A values are to be met as a minimum requirement by July 1, 1977, by all dischargers.

Permit Duration

Permits may be issued for periods up to five years. If a discharger is expected to achieve A levels by July 1, 1977, and he commits to a program to accomplish this, he will expect a permit of extended duration, i.e., five years. Short term permits, e.g., less than 3-5 years, should be issued only in those situations where there is a significant water quality problem that may not be resolved or where the technology for pollution abatement is not, in your opinion, sufficient, or where the discharger is not sure of the success of his planned program. In these instances the permit should be written to terminate 9 months after the conclusion of the compliance plan.

Settleable Solids

The presence of settleable solids in treated effluent can show biological system misfunction and clarifier misoperation, assuming it is well designed. The absence of settleable solids can therefore indicate continuing operational stability. Analysis for settleable solids may be a useful monitoring tool to supplement and, to a certain extent, reduce the frequency of BOD_5 and suspended solids analyses, thus providing greater operational control.

Staged Discharge

There may be instances where variability in receiving water flow (either regulated or natural causes) precludes discharge of even very highly treated wastewater due to stream quality considerations during low flow periods. In such instances, treated wastewater may be stored for discharge when receiving water considerations allow it. The discharge permit may therefore contain supplemental conditions permitting discharge in regulated amounts. In any case the total weight of individual pollutants so scheduled shall not exceed an appropriate limitation based on production capability.

Batch, Seasonal and Intermittent Operations

Batch, seasonal, and intermittent operations will be limited in the same terms as are continuous operations, i.e., a monthly operating average and a daily maximum, each expressed in pounds per day of individual pollutants. It may also, however, be necessary to set a limit on the rate of discharge in terms of pounds per hour in order to prevent violation of receiving water quality standards due to slug discharge.

The rationale is based upon the essential logic in the discussion of 'production capability' plus a general condition in each permit requiring that the permittee operate the treatment facilities efficiently at all times. No attempt should be made to specify the days upon which a discharge is authorized.

Monitoring and Self Reporting

Separate guidance has been written for monitoring and self reporting. Generally the approach is that the permittee notify the regulatory agency in the event of violation of a daily maximum limitation (in which case, if immediate telephone notification is required, a 24-hour telephone number should be supplied), and that the permittee shall monitor and report routinely at such a frequency as to assure management and the regulatory agency that abatement programs are being implemented and the permit terms and conditions observed. Any discharge characteristics that are limited should be monitored, not necessarily all at the same frequency. Avoid limiting the same characteristic by more than one limitation; for instance, oxygen demand by BOD_5, COD and TOD.

Compliance Schedules

Proposed or tentative compliance schedules should be expressed in months elapsed from the effective date of the permit until the permit is issued at which time specific dates should be typed into the schedules. Interim limitations for 'immediate' compliance (e.g., one month from effective date) should be imposed as necessary and desirable in order to either abate an "imminent hazard to public health or safety" or because it is feasible to abate the discharge immediately. Compliance with other limitations may require installation of waste treatment facilities, which would require additional implementation and compliance schedules.

It should be noted that a pollution abatement program for a complex industrial facility may involve installation of more than one treatment facility. Our interest is in the end result, not on the design or program planning, excepting insofar as total compliance is achieved in a timely manner not to exceed July 1, 1977. Therefore, in a staged program, interim limitations may be imposed based upon completion of facets of an overall abatement program.

Treatment models described in the guidance are not intended to specify procedures or processes, but to illustrate the means by which the limitations may be met. Alternatives which will achieve the same end are acceptable.

Metric Units

All permits should be written in metric units (kilograms, meters, kiloliters) with equivalent English units (pounds, feet, gallons) in parentheses alongside.

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APPLICABILITY

These instructions apply to Standard Industrial Classification Codes 2819, 3334, 3352, and 3361. These include rolling and drawing of wire, rod, bars, and structural shapes; and extrusion of tubes and shapes.

SUBCATEGORIES CONSIDERED

Operations in the aluminum industry are considered under the following subcategories: refining of bauxite; primary smelting; ingot casting and foundry operations; rolling of plate and sheet; rolling of foil; rolling and drawing of rod, bar and structural shapes; and extrusion of aluminum shapes and tubes.

OPERATIONS EXCLUDED

These guidelines cover only the listed operations. Metal Cleaning and Coatings is included in the Metal Finishing guidance.

Secondary smelting guidance has not yet been developed. This operation uses scrap aluminum as raw material and is significantly different from the primary operation in regard to water usage.

Not covered in this guidance are the discharges of non-contact cooling water and boiler water blowdown.

APPLICATION OF LIMITATIONS

The use of the interim guidance is limited solely to bauxite refining.

ABATEMENT MODELS

Bauxite Refining

The discharge from this operation is a mud slurry that comes from the washing of the solids to recover caustic salts for reuse. The mud slurries can be impounded in lagoons where the solids will settle out. The solids should be allowed to accumulate in the bottom of the lagoon and the water evaporated to prevent any discharge of solids. The permit should be drafted with a suspended solids limit that would mean essentially no discharge.

Primary Smelting

This subcategory covers only scrubber water used to wash the gas from the electrolytic cells. It includes pre-bake and Soderberg type operations. It does not include other water uses such as non-contact cooling of rectifiers.

The B level can be attained by lime addition and clarification. The A level treatment would include the addition of polyelectrolytes with detention sufficient to attain the required limits. The A level assumes recycle of this wash water.

ABATEMENT MODELS (continued)

Ingot Casting and Foundry Operations

The discharge from this operation comes from water sprayed over the molds and ingot surfaces. The minimum treatment is skimming and clarification. The A level assumes recycle and treatment of the concentrated blowdown by clarification and air flotation or filtration.

Rolling of Plate and Sheet

This subcategory includes the first reduction of ingots to plate and sheet by hot rolling and cold rolling mills. The minimum treatment should be lime addition, emulsion breaking, skimming, and clarification. The A level represents recycle and treatment with lime addition and then air flotation and clarification.

Rolling of Foil

Cold reduction of sheet to foil normally requires a mineral base oil and in some case an oil emulsion. The limits assume extension of plate and sheet rolling; if separate facilities are used, the water usage may be significantly higher. The minimum treatment should be emulsion breaking, skimming, and clarification. The A level assumes recycle.

Rolling and Drawing of Rod, Bar, and Structural Shapes

A low-oil-content emulsion is used in this operation to lubricate and cool the aluminum being rolled into rods, bars and structural shapes. The model treatment system is emulsion breaking, skimming and clarification, with recycle assumed for the A level. Not included in the guidelines is water used for equipment cooling or in die casting or forging operations where the water does not come in contact with the metal.

Extrusion of Tubes Shapes

The water from this category comes from leakage and maintenance of the water-hydraulic presses. The discharge could be continuous or batch. The model treatment system is again emulsion breaking, skimming and clarification, with recycle used for the A level.

ALUMINUM

EFFLUENT LIMITATIONS

Process	Parameter	Pounds per 1,000 Schedule A	Pounds Schedule B
Refining of Bauxite		essentially no discharge	
Primary Smelting	Fluoride	0.38	5.0
	Total Suspended Solids	0.5	5.0
	Oil and Grease	0.25	2.5
Ingot Casting & Foundry Operations	Total Suspended Solids	0.08	0.75
	Oil	0.08	0.38
Rolling of Plate and Sheet	Total Suspended Solids	0.056	0.55
	Oil	0.028	0.28
	Phosphate as P	0.006	0.09
Rolling of Foil	Total Suspended Solids	0.167	0.5
	Oil	0.083	0.25
Rolling & Drawing of Rod, Bar and Structural Shapes	Total Suspended Solids	0.0834	0.75
	Oil	0.0417	0.375
Extrusion of Aluminum Shapes	Total Suspended Solids	0.11	0.75
	Oil	0.054	0.375

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APPLICABILITY

These instructions apply to Standard Industrial Classification Code 2063.

OPERATIONS EXCLUDED

Separate guidance is being issued for cane sugar.

PRODUCTION BASIS

The daily processing capacity is expressed in tons per day of sugar beets.

APPLICATION OF LIMITATIONS

Additional information since the preparation of this guidance indicates that schedule A requirements may be less stringent than BPCTCA. A closed condenser water cycle should be considered in the preparation of any permit for the Beet Sugar Industry.

OTHER LIMITATIONS

The following may be significant parameters depending on production methods and receiving water characteristics:

Ammonia Nitrogen
Temperature
Settleable Solids - Settleable solids shall not exceed 0.1 ml/l.

ABATEMENT MODELS

The process control and the treatment system visualized for attainment of the recommended effluent limitations for the beet sugar industry is as follows:

1) Separate impoundment of all lime mud waste and flume mud waste.
2) Installation of a closed cycle or other treatment for flume waters.
3) Complete removal and disposal of settleable solids from the closed flume water transport circuit.
4) Complete reuse of pulp press and transport waters.
5) Recovery and/or reuse of all Steffen filtrates.
6) Separate impoundment and/or reuse of strong general plant wastes (e.g., acid and caustic boilouts, line cleaning solutions, etc.)
7) Retention and disposal of flumed residual ash waste.
8) Maximum water reuse in all plant operations.

EFFLUENT LIMITATIONS

Criteria	Lbs/Ton Beets Sliced
Five-Day BOD	0.50
Total Suspended Solids	0.50

BEVERAGES

APPLICABILITY

These instructions apply to Standard Industrial Classification Codes 2084 and 2085.

SUBCATEGORIES CONSIDERED

Limitations are considered separately for distilled spirits (excluding rum distilleries); wineries (table wines) in press season; wineries (table wines) in process season; and wineries (distilled wines and brandies).

OPERATIONS EXCLUDED

Rum distilleries are not covered by this guidance.

PRODUCTION BASIS

The maximum daily production (as determined at the time of application) shall be the highest average level sustained for seven consecutive operating days of normal production.

APPLICATION OF LIMITATIONS

The guidance should be limited to use for whiskey distilleries and wineries.

Wineries making table wines have two phases of operation; (1) the pressing of grapes into juice, and (2) the processing of juice into wine. During the pressing season, the tonnage of grapes processed is a significant production unit but during process season this unit is not valid. Many wineries produce products blended with purchased wine, thus, wine production is chosen as the significant production unit during the non-pressing season.

The following may be significant parameters depending on production methods and receiving water characteristics:

Color
Turbidity
Foam
Temperature
Nitrogen
Phosphorous

Settleable Solids - Settleable solids shall not exceed 0.1 ml/l.

Consider receiving water quality and available technology if applying effluent limits to these parameters.

ABATEMENT MODELS

Distilled Spirits (Distilleries)

The following process considerations and treatment facilities can be used to achieve the "best practicable pollution control technology currently available":

1. Recycle of cooling water;
2. Maximum by-product recovery from stillage;
3. Improved evaporator entrainment for better separation of organics contained in released water vapors in the feed recovery operation;
4. Elimination of frequent and unnecessary spillage, over-flows, dumps, and excess running water;
5. Biological oxidation by trickling filters and/or activated sludge.

The Schedule A effluent limits are based on an effluent BOD_5 and suspended solids concentration of 30 mg/l. The process wastewaters from this industry are readily amenable to biological treatment. The Schedule B effluent limits are based on 90% removal of the standard raw waste loads and represent good present-day abatement practices.

Wineries

The following elements were used to develop the best "practicable pollution control technology currently available" for "wineries":

1. Wine recovery from "lees" and dry handling of the resulting waste solids;
2. Elimination of frequent and unnecessary spillage, over-flows, dumps, and excess running water:
3. Elimination of cloth filters;
4. Use of low-volume, high-pressure methods of cleaning process tanks;
5. Maximum possible recirculation and reuse of cooling, wash-up, and process water;
6. Biological oxidation by activated sludge or equivalent process;
7. Disinfection, if necessary.

The Schedule A effluent limits are based on BOD_5 and suspended solids levels of 30 and 40 mg/l respectively. In one plant an activated sludge treatment system is achieving effluent qualities consistent with "A" levels. Two other wineries are presently constructing treatment systems; one an activated sludge system, the other an RBC unit. Each system is designed to produce effluent qualities consistent with Schedule "A". The RBC unit design was verified by pilot plant studies. All three of these wineries produce table wines, but the

ABATEMENT MODELS (continued)

technology is transferable to wastewater from production of distilled wines and brandies.

The flow data used was only that portion representing process and wash-up wastewater and does not include utility wastewaters such as cooling water or boiler blow-down.

EFFLUENT LIMITATIONS - BEVERAGE INDUSTRY
LB/UNIT PRODUCTION

INDUSTRY CLASS	UNIT PRODUCTION	SCHEDULE A		SCHEDULE B	
		BOD_5	SUSPENDED SOLIDS	BOD_5	SUSPENDED SOLIDS
DISTILLED SPIRITS[a] (Distilleries)	1000 Bushels of Grains Processed	11.5	11.5	19	19
WINERIES, Table Wines					
Press Season	Tons of Grapes	0.15	0.20	0.22	0.29
Process Season	1000 Gallons of Wine	5.8	7.8	7.5	9.7
WINERIES, Distilled Wines and Brandies	Tons of Grapes	0.23	0.23	0.39	0.39

(a) Except rum distilleries

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APPLICABILITY

These instructions apply to Standard Industrial Classification Code 2062 (1967 SIC Manual) Cane Sugar Refining.

OPERATIONS EXCLUDED

For guidance on facilities manufacturing raw sugar from cane, see the separate document on SIC 2061.

APPLICATION OF LIMITATIONS

Guidance should be applied only to refineries whose maximum capacity is 500 tons per day or greater.

Daily production shall be expressed in tons per day of raw cane sugar, and is the highest average production sustained over 20 days of full normal operation. (For a cane factory and refinery at the same site, the permitted discharge per day shall be the total of the permitted factory and refinery waste loads, but only if both are operating concurrently).

Settleable solids shall not exceed 0.1 ml/1.

The following also may be significant parameters depending on production methods and receiving water characteristics:

Color
Turbidity
Temperature
Nitrogen
Phosphorous
Ammonia

ABATEMENT MODELS

The waste management systems listed below represent the generalized model used to develop the effluent limitations recommended for the cane sugar refining industry as shown in Schedule A and under general criteria. There are a great many variations possible (including discharge to a municipal treatment system) which can be tailor-made to processing plants in order to achieve the desired results. The Schedule A levels were obtained by first separating the waste effluent to reflect the two major waste streams, i.e., barometric condenser effluent and process wastewater. It was considered that the best practicable method of handling the dilute high volume barometric condenser effluent is through application of process control rather than an add-on treatment system. The characteristics of the process wastewater, i.e., high carbohydrate content, make the use of biological treatment the apparent best practicable treatment method.

ABATEMENT MODELS (Continued)

1. The washwaters from the decolorizing and deashing columns are combined with carbon transport drain waters, routine floor and equipment washings, possible bad or spilled process batches, and the washdowns from the truck and/or railroad car receiving/delivery stations (providing these latter flows do not contain toxic elements), and these combined wastewaters are directed to biological treatment sites. Treatment may consist of activated sludge or equivalent treatment means. Long-term impoundment/stabilization of these wastewaters may be an acceptable alternative where sufficent land is available.

2. Dry recovery and landfill disposal of filter cakes (muds). Slurrying and impoundment of filter muds with eventual disposal/reuse on nearby farms is a recognized alternative.

3. Elimination of indiscriminate wasting and discharge of powered carbon (e.g., where used on a once-through basis and as the major means of decolorizing sugars).

4. Minimum organic entrainment and carryover from the evaporators and pans intc the barometric condensers. Maximum allowable waste loads are predicated upon availability of adequate equipment to handle varying process loads; good design of equipment and entrainment arrestors, demisters and other control devices, and conscientious operator attention to maintain evaporators, pans, condensers, and the interconnecting circuits in careful balance.

5. Scums from the phosphatation-frothing clarifier operations are to be removed in subsequent vacuum or pressure filter units, and to be treated in similar fashion to the filter muds. Special handling of these scums is required and their discharge to the receiving stream is not acceptable.

6. Segregation, impoundment, and/or possible reuse of strong cleaning/scouring waste and other similar plant and chemical wastes.

7. Well designed and maintained impoundment ponds.

8. The elimination, special handling and/or treatment of extraneous discharge, especially nondescript storm drains; the runoff from refuse piles and storage areas: drainage from the handling, disposal and/or resue of bagasse and trash; and fly ash and air scrubbing effluents from air

ABATEMENT MODELS (continued)

pollution control devices are included in the subject effluent guidelines.

EFFLUENT LIMITATIONS - NUMBERS

Parameter	lb/ton Raw Sugar Processed	
	Schedule A	Schedule B
BOD_5	0.65	1.0
Suspended Solids	0.2	1.0

CANNED AND FROZEN FRUITS
AND VEGETABLES

APPLICABILITY

These instructions apply to Standard Industrial Classification Codes 2033, Canned Fruits and Vegetables; 2034, Dried and Dehydrated Fruits and Vegetables; and 2037, Frozen Fruits and Vegetables (1967 SIC Manual).

SUBCATEGORIES CONSIDERED

Effluent limitations are set by commodity.

OPERATIONS EXCLUDED

The guidance covers only the listed commodities. SIC 2031, 2032, 2035, 2036 are not covered.

APPLICATION OF LIMITATIONS

The guidance may be used only for very large installations, i.e., those producing over 500 cases per hour and operating over a period of six continuous months or more. Commodity areas are limited to citrus, asparagus and apples.

The maximum commodity input shall be the highest average level sustained for seven consecutive operating days of normal production. For plants processing a variety of food commodities, the permitted discharge shall be determined for each commodity, as above, the sub-totals added together to obtain a total permitted daily discharge.

This limit will be determined from the review of data supplied by the company or of maximum daily processing rates of each commodity or combination of commodities that could be processed on any single day.

Settleable Solids - Settleable solids shall not exceed 0.1 ml/l.

The following may be significant parameters depending on production methods and receiving water characteristics:

Color
Turbidity
Temperature

ABATEMENT MODELS

The wastewater from this industry is generally characterized as containing a high percentage of soluble organic material. For this reason biological treatment is considered the best practicable method of treatment.

ABATEMENT MODELS (Continued)

The following waste management control system and process controls were used as a model for developing the recommended effluent limitations for this industry:

1. Use of in-plant controls to conserve water use and reduce waste loads through:
   (a) Maximum practicable recirculation and reuse of cooling, condensate, fluming, cleaning, washing, and filling waters.
   (b) Dry handling and disposal of solids wastes from floors, machines, and other work areas.
   (c) Positive control for the prevention of unnecessary overflows, spillages, and dumps.
   (d) The elimination of excess running water.
2. Use of dry caustic peeling or equivalent procedures wherever technically feasible.
3. Maximum by-product recovery.
4. Elimination of extraneous and uncontrolled drainage from refuse storage areas.
5. Flow equalization.
6. Biological oxidation using aerated lagoons or activated sludge.
7. Secondary clarification depending upon particular treatment mode.
8. Disinfection, if necessary.

EFFLUENT LIMITATIONS

lb/ton of Raw Material Processed

Material Processed	Schedule A		Schedule B	
	BOD_5	Suspended Solids	BOD_5	Suspended Solids
Apples	1.4	1.9	3.1	2.1
Apricots	2.7	3.6	9.9	6.7
Asparagus	3.0	3.0	3.0	3.0
Beans, Snap	1.6	2.0	2.3	2.0
Beets	1.2	1.6	4.6	3.1
Carrots	1.2	1.7	3.8	2.5
Cherries	0.9	1.2	2.8	1.8
Citrus	0.6	0.6	0.6	0.6
Corn	0.8	1.1	1.9	1.2
Peas	1.9	2.6	6.1	4.1
Peaches	2.0	2.6	6.9	4.6
Pears	1.2	1.6	3.3	2.2
Potato	1.0	1.4	3.0	2.0
Pumpkin & Squash	0.5	0.7	1.4	0.9
Sauerkraut	0.3	0.2	0.4	0.3
Spinach	2.2	2.9	3.9	3.1
Sweet Potato	0.9	1.2	2.9	1.9
Tomato	0.9	1.2	1.7	1.2

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CEMENT, LIME, GYPSUM AND FLAT GLASS

APPLICABILITY

These instructions apply to Standard Industrial Classification Codes 3211, 3241, 3271, 3273, 3274, 3275, and 3292.

SUBCATEGORIES CONSIDERED

Operations in this industry are considered under the following subcategories: flat glass; flat glass products made of purchased glass; cement, hydraulic; concrete block and brick; concrete products other than block and brick; ready mix concrete; lime, gypsum products; and asbetos products.

APPLICATION OF LIMITATIONS

The interim guidance is acceptable for use for the cement industry with the following limitations. The guidance specifies parameters for suspended solids, COD and pH but does not cover heavy metals and runoff from storage piles. All permits issued should specify limitations for heavy metals and runoff from storage piles.

The flow base used in developing these limitations represents process water only and does not include cooling water. Concrete Products, and Ready Mix Concrete are generally classed as "job-shop operations" wherein wide variations in production levels occur, therefore, these industries are limited on concentration only.

ABATEMENT MODELS

The industries in these categories grind, heat, crush, and otherwise process basically inert mineral substances to produce the final end product. As a result, the major pollutants are suspended solids consisting of mineral fragments. These can adequately be removed by sedimentation, with the addition of coagulants as required. Such treatment is widely practiced in industry, with the major failures resulting from insufficient detention time and shortcircuiting of flow. Acceptable criteria which are available for construction of settling ponds should be utilized in the design and construction of such ponds.

Dissolved inorganic ions, chiefly sulfate, leached from the raw material or from air-pollution control devices, constitute the second major class of pollutants. Significant reduction of these inorganics can be realized by modifications in the process.

ABATEMENT MODELS (continued)

Dissolved heavy metals may result from leaching of raw materials, from plating operations, or from reagents added to the cooling or process waters. Heavy metals are especially troublesome in cement plants utilizing oyster or clam shells as raw materials.

The specified levels can be achieved by a combination of process modifications and metal precipitation. Oil is used primarily as a binder and/or emulsifier in the manufacture of both asbestos and glass.

The following process controls will be useful in achieving these effluent limitations:

A. Maximum practical recirculation and reuse of cooling waters, condensates, cleaning, washing and other process flows should be practiced. Process water from lime and gypsum manufacturing should be used for hydrator supply, scrubbing, and consumptive used.

B. Water use, and time of contact of water with leachable substances, should be reduced to a minimum. Frequent and unnecessary spillage, overflows, excess running water, and inefficient handling and washing methods should be eliminated.

The treatment system model used in the development of these limitations is as follows:

A. Equilization of Flow
B. Sedimentation (Coagulants where required)
C. Neutralization
D. Metal Precipitation (where required)

Asbestos products facilities should recycle mix and curing water to maximum possible extent for both Level A and Level B limitations.

Concrete products and Ready Mix Concrete facilities should be encouraged to recycle their wash water to the maximum extent.

EFFLUENT LIMITATIONS - LEVEL A

Subcategory	Load/Product Unit	Suspended Solids	COD	Remarks
Cement, Hydraulic				
With Leaching				
Dry Process	lbs/1000 bbl	25	25	
Wet Process	lbs/1000 bbl	7	7	
Without Leaching				
Dry Process	No Process Wastewater Discharge.			
Wet Process	No Process Wastewater Discharge. Recycle excess thickener water to grinding operation.			
Concrete Products	Concentration mg/l	20	20	
Ready Mix Concrete	Concentration mg/l	20	20	
Gypsum Products	lbs/1000 Tons	4	4	Recycle Grinding waters.
Lime Manufacture	lbs/1000 Tons	50	50	Use scrubber effluent for hydrator.

EFFLUENT LIMITATIONS - LEVEL A (Cont.)

Subcategory	Load/Product Unit	Suspended Solids	COD	Remarks
Asbestos Products	lbs/1000 Tons asbestos used			
Insulation		99	99	
Asbestos Paper		152	152	
Cement Pipe & Siding		200	200	
Flat Glass Products	lbs/1000 Tons			
Float Glass		5	5	Total Phosphorous 0.25 lbs/1000 Tons
Plate, Rolled Laminate and Tempered Glass	lbs/1000 ft^2	84	84	Total Phosphorous 4.2 lbs/1000 Tons Hexane Exactractables 8.4 lbs/1000 Tons
Mirrored Glass	lbs/1000 ft^2	0.2	0.2	Total Phosphorous 0.01 lbs/1000 ft^2

EFFLUENT LIMITATIONS - LEVEL B

Subcategory	Load/Product Unit	Suspended Solids	COD	Remarks
Cement, Hydraulic				
With Leaching				
Dry Process	lbs/1000 bbl	42	42	
Wet Process	lbs/1000 bbl	11	11	
Without Leaching				
Dry Process	No Process Wastewater Discharge.			
Wet Process	No Process Wastewater Discharge. Recycle excess thickener water to grinding operation.			
Concrete Products	Concentration mg/l	40	40	
Ready Mix Concrete	Concentration mg/l	40	40	
Gypsum Products	lbs/1000 Tons	8	8	Recycle Grinding Water
Lime Manufacture	lbs/1000 Tons	100	100	Use Scrubber effluent for hydrator.
Asbestos Products	lbs/1000 Tons asbestos used			
Insulation		198	198	
Asbestos Paper		304	304	
Cement Pipe and Siding		400	400	

EFFLUENT LIMITATIONS - LEVEL B (Cont.)

Subcategory	Load/Product Unit	Suspended Solids	COD	Remarks
Flat Glass Products	lbs/1000 Tons			
Float Glass		10	10	Total Phosphorous 0.50 lbs/1000 Tons
Plate, Rolled, Laminated and Tempered Glass	lbs/1000 ft^2	168	168	Total Phosphorous 8.4 lbs/1000 Tons Hexane Extractable 12.5 lbs/1000 Tons
Mirrored Glass	lbs/1000 ft^2	0.4	0.4	Total Phosphorous 0.02 lbs/1000 ft^2

APPLICABILITY

These instructions apply to Standard Industrial Classification Codes 11 and 12.

SUBCATEGORIES CONSIDERED

Operations in the coal mining industry are considered under the following subcategories: coal preparation plants, underground coal mining, and surface mining (strip mining).

OPERATIONS EXCLUDED

This guidance covers only the listed operations. Hardrock mining, specifically, is excluded.

APPLICATION OF LIMITATIONS

Concentrations schedule (A) should be applied for mine drainage and preparation plant discharges, with the exception of the alkalinity criteria, which should be changed to acidity with an upper limitation of 10 mg/l in both cases. This guidance should not be used as a basis for surface mining permits and priority should be placed on significant dischargers.

Wastes from coal mining operations often are unrelated, or only indirectly related, to production quantities. Therefore, effluent limitations are expressed in terms of concentration rather than units of production. Due to the wide variation of geological and hydrological factors in the coal industry, a pound per day limitation is impractical.

EFFLUENT LIMITATIONS

Underground Mine Drainage

1. There shall be no dilution of the effluent stream.

Surface Mining

1. The velocity of discharge shall be such that scouring of stream bed shall not occur.

2a. All treatment facilities shall be of sufficient size to handle the run-off resulting from a once-in-ten-years' storm. (Source-Kentucky revised statutes relating to strip mining and reclamation, 1966, Chapter 350, Regulation 11.)

EFFLUENT LIMITATIONS (Continued)

b. The effluent shall not contain suspended matter in excess of 30 mg/l, (A level) or 100 mg/l, (B level) with the exception of during and four hours after a major precipitation event.

The operator is not at any time to discharge an effluent containing suspended matter in excess of 1,000 mg/l from any area of land affected. A major precipitation event is the number in inches of water greater than the duration of the storm in minutes divided by 100 plus 0.2. (Source - U.S.D.A. miscellaneous publication #204, "Rainfall Intensity and Frequency Data, 1935.) (See Graph)

Since the operator must show the major precipitation event has occurred, it will require an installation at the operating site of a recording rain gauge. In addition, precipitation must be included in the monitoring program.

Area of land affected is the area of land from which overburden is to be or has been deposited, which shall include all land affected by the construction of new roads or the improvement or use of existing roads, other than public roads, to gain access and to haul coal.

c. Sudden release of large volumes of water from the treatment facility, as during a storm, must be prohibited to prevent scouring of the treatment facility. Therefore, there should be established a level at which the flow will be diverted from the treatment facility. This level must be set for each individual operation taking into consideration the following (i) average precipitation of area; (ii) receiving stream water quality standards; and (iii) the volume of water discharged during a once-in-ten-years' storm.

The applicability of any of the parameters listed must be at the discretion of the Regional Administrator.

ABATEMENT MODELS

The effluent limitations for the coal mining industry are based on utilization of the geochemical approach which encompasses oxidation potentials, reaction rates, and solubility constants, as well as pH control.

A. Preparation Plant Wastes

Semi-colloidal particles of coal, shale, and clay in suspension form one of the principal pollutants--suspended solids. Reduction in the amount of suspended solids reaching the stream can be

ABATEMENT MODELS (continued)

achieved by installation of settling and impounding facilities. Other methods of control include froth flotation, flocculation, filtration, and mechanically operated sedimentation and clarification basins. Organic coagulants such as polyacrylamide, used alone or in combination with inorganic coagulants, may demonstrate good settling qualities.

In addition to the problem of suspended solids, the effluent from coal washing may contain iron and sulfur compounds in suspension.

In high enough concentration, these would cause considerable loading on the stream and will require chemical treatment before discharge. The effluent limitations for preparation plant wastes reflect the eventual goal of complete recycling.

B. Underground Mine Drainage

The term "underground mine drainage" as used herein applies not only to discharges which have a low pH value but also to discharges with a neutral value but which are high in metallic salts which can be a problem in an alkaline environment.

Drainage from coal mines may be acid and may contain sulfuric acid, ferrous and ferric iron, aluminum, and manganese in significant concentrations. Carbon dioxide, and calcium, magnesium, and sodium salts, all of which contribute to a very high degree of hardness may also be present. Preventive measures might include reduction of the amount of infiltration into the mine, controlled dewatering to reduce contact with acid-forming materials, removal of acid forming materials, sealing or flooding of inactive mines, and replacement of waste rock. Treatment methods which might be used to meet the effluent requirements include neutralization, and removal of iron and manganese.

C. Surface Mining

To meet the effluent limitations for surface mining, operators will have to employ one or all of the following methods:

1. Keep as much water as possible out of the operating site;
2. Provide proper drainage and removal to treatment facility;
3. Separate contaminated and non-contaminated water; and
4. Insure that all water receives proper pH control as well as removal of suspended solids and metallic materials.

ABATEMENT MODELS (continued)

At present, a number of operations are employing lagooning systems. Evaporation results in a reduction in the suspended solids as well as the ferric hydroxide and the ferric sulfate. Precipitation eventually results through the oxidation process.

One source of acid mine water is the reuse pile or "gob pile" which contains sulfurous refuse from the preparation and cleaning process. Control of the gob piles could eliminate a source of acid drainage. The simplest system for control is to cover these piles with a non-acid producing material such as two feet of dirt. At a later time, to insure stability, some form of vegetation should be planted. Sealing or benching of the cut area so that there are no opportunities for oxidation of pyritic material will eliminate a major part of the problem.

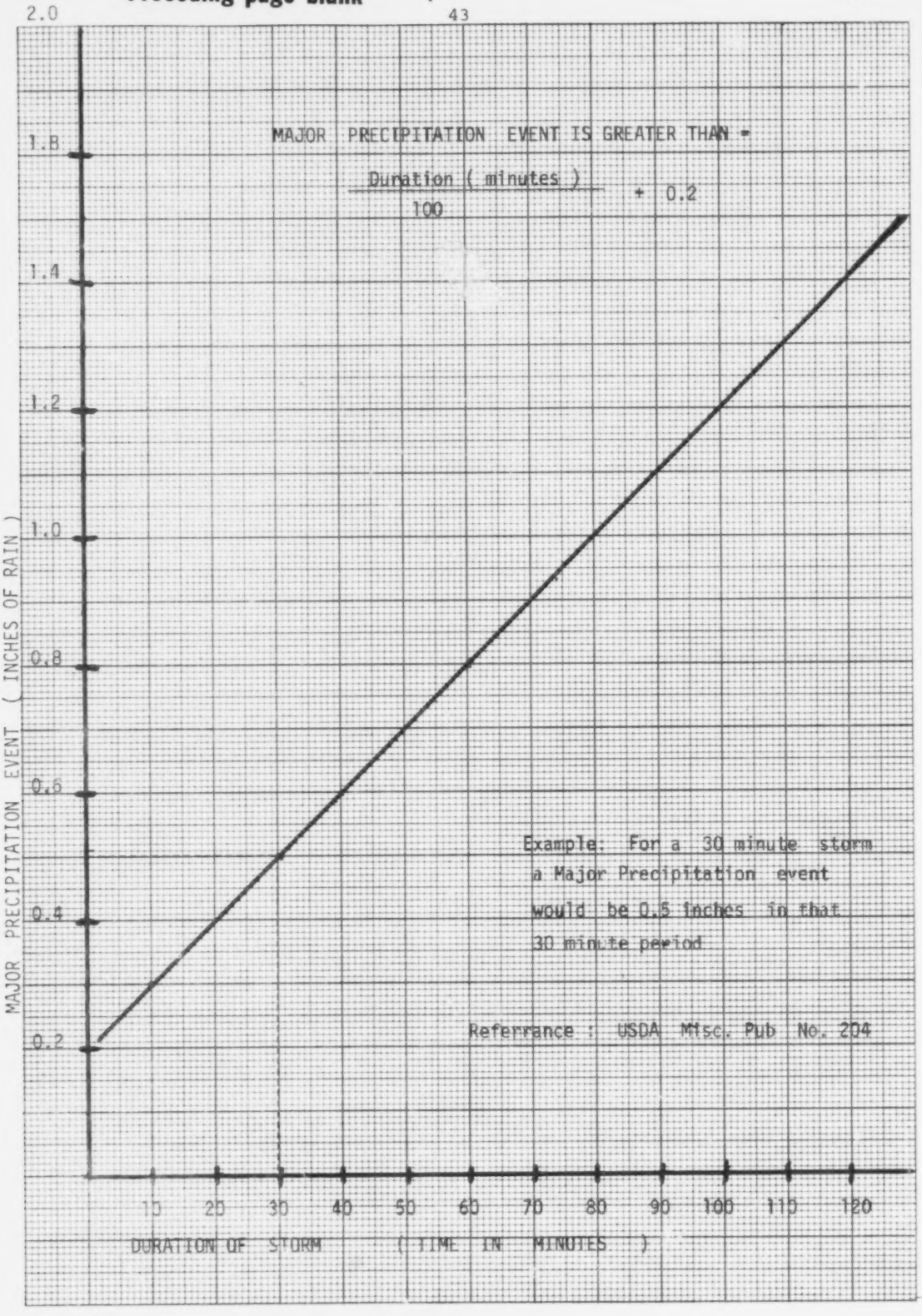
Neutralization

Neutralization to pH of 6.0 to 9.0 can be accomplished by the use of lime, limestone, oxidation, or varied combinations of the three depending on the characteristics of the waste.

The use of a two-step neutralization process, that is, the use of limestone to bring the pH to 5, with the addition of lime to complete the neutralization, could result in a considerable savings both in the cost of chemicals and in sludge handling.

EFFLUENT LIMITATIONS

	Preparation Plants		Underground Mine Drainage		Surface Mining	
	A	B	A	B	A	B
Suspended Solids	30 mg/l	40 mg/l	30.0 mg/l	40 mg/l	30.0 mg/l	100 mg/l
pH	6.0-9.0	6.0-9.0	6.0-9.0	6-0-9.0	6.0-9.0	6.0-9.0
Total Iron	4.0 mg/l	7.0 mg/l	4.0 mg/l	7.0 mg/l	4.0 mg/l	7.0 mg/l
Alkalinity	Greater than acidity *1		greater than acidity *2		greater than acidity *3	


MAJOR PRECIPITATION EVENT IS GREATER THAN =
Duration (minutes)
100
+ 0.2
MAJOR PRECIPITATION EVENT (INCHES OF RAIN)
2.0
1.8
1.4
1.2
1.0
0.8
0.6
0.4
0.2
Example: For a 30 minute storm a Major Precipitation event would be 0.5 inches in that 30 minute period
Referrance : USDA Misc. Pub No. 204
10
20
30
40
50
60
70
80
90
100
110
120
DURATION OF STORM (TIME IN MINUTES)

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APPLICABILITY

These instructions apply to Standard Industrial Classification Codes 202 and 5043.

SUBCATEGORIES CONSIDERED

Operations in the dairy industry are considered under the following subcategories: receiving stations, fluid milk processing, butter, natural cheese, ice cream, condensed milk, dry milk, whey condensing, whey drying, and cottage cheese.

PRODUCTION BASIS

The maximum daily receipts in 1,000 pounds milk equivalent, shall be the highest average level sustained for seven consecutive operating days of normal production, determined at the time of application. (Milk equivalent may be determined from Attachment 1.).

APPLICATION OF LIMITATIONS

If permits are issued in the dairy industry, they should be issued only to very large operations.

Except for cottage cheese manufacturing, there is little statistical difference between unit wastewater flows from single product plants and multi-product plants. The unit loads for each product are additive and proportional to the milk equivalent used in each operation. However, the level for receiving stations applies only to receiving stations and is not additive to product plants.

The following may be significant parameters depending on production and receiving water characteristics:

Color
Turbidity
Foam
Ammonia
Nitrogen
Phosphorous

Settleable Solids - Settleable solids shall not exceed 0.1 mg/l.

ABATEMENT MODELS

The following generalized production process controls and treatment systems were used as a model in developing the effluent limitations for the dairy products industry:

ABATEMENT MODELS (continued)

1. good degree of management effort in controlling available product and raw material losses;
2. recovery of whey and by-products;
3. biological oxidation using trickling filter or various modifications of activated sludge;
4. secondary clarification;
5. disinfection, if necessary.

The system described above is a generalized model which is applicable to the entire industry. At the present time there are very few alternatives to this model. Of major importance in the above model is the control of the production process.

EFFLUENT LIMITATIONS

(lbs/1000 lbs milk or milk equivalent)

Subcategory	Schedule A		Schedule B	
	BOD_5	Suspended Solids	BOD_5	Suspended Solids
Receiving Stations	0.032	0.032	0.053	0.053
Fluid Milk Processing	0.03	0.03	0.13	0.13
Butter	0.03	0.03	0.13	0.13
Natural Cheese	0.03	0.03	0.20	0.20
Ice Cream*	0.03	0.03	0.45	0.45
Condensed Milk	0.03	0.03	0.11	0.11
Dry Milk	0.03	0.03	0.11	0.11
Whey Condensing	0.03	0.03	0.15	0.15
Whey Drying	0.03	0.03	0.20	0.20
Cottage Cheese	0.13	0.13	0.95	0.95

NOTE: *Novelty items (e.g., stick confections, popsicles) shall be considered on a case-by-case basis.

ATTACHMENT I
DETERMINATION OF MILK EQUIVALENT

Milk equivalent is the quantity (in pounds) of milk used to produce one pound of product. Milk is considered to include skim milk, whole milk, and other milk with a butterfat content of less than 3.5 percent. If the facility receives higher than 3.5 percent butterfat milk or cream as a raw product, an adjustment according to the butterfat ratio should be made. In the case of cream this ratio would be 48/3.5; 1000 lbs of cream would therefore be equivalent to 13,700 pounds of milk.

If the raw product received is whey, the milk equivalent should be considered as the BOD ratio of whey to whole milk (i.e. 0.4); therefore, 1000 lbs of whey is equivalent to 400 lbs of milk. If the pounds of final product are available but no raw material data are known, the following data can be used to convert the final product to its milk equivalent.

Product	lb. Milk Equivalent/lb Product
Butter	21.3
Natural Cheese	9.9
Cottage Cheese	6.3
Ice Cream	2.7
Condensed Milk	2.4
Dry Whole Milk	7.4
Dry Skim Milk	11.0

APPLICABILITY

These instructions apply to Standard Industrial Classification 2871.

SUBCATEGORIES CONSIDERED

The following categories are considered:

Sulfur Burning, Sulfuric Acid Plants
Phosphoric Acid
Normal Superphosphate
Triple Superphosphate
Mono-Ammonium Phosphate
Di-Ammonium Phosphate
N-P-K Fertilizers
Ammonia Production-Centrifugal and Reciprocal Compressors
Ammonium Sulfate
Urea
Nitric Acid
Ammonium Nitrate

OPERATIONS EXCLUDED

Other SIC codes are addressed only to a limited extent. Ammonia, ammonium nitrate, ammonium sulfate, and all of the acids (sulfuric phosphoric, and nitric) are also listed under SIC 2819. Urea is listed under SIC 2818. Phosphoric rock mining and potash mining (SIC 1474) are <u>not</u> covered in this guidance.

APPLICATION OF LIMITATIONS

The interim guidance should be used only for primary producers and should not be used for formulators. Capacity of facilities permitted should equal or exceed:

	NH_3	100,000 tons/yr
prilled	NH_4NO_3	100,000 tons/yr
synthetic	$(NH_4)_2SO_4$	100,000 tons/yr
	$(NH_4)_2HPO_4$	100,000tons/yr
prilled	$NH_4H_2PO_4$	50,000 tons/yr

EFFLUENT LIMITATIONS

Fertilizer Industry process waste contain fluoride, phosphorus, suspended solids, oil (primarily from compressor and pumping operations), and nitrogen from ammonia and nitrates. Utility blowdown wastes include alkalinity, suspended solids, phosphorus, zinc, chromium, and free chlorine. Parameters like iron, vanadium, nickel, and cobalt are

EFFLUENT LIMITATIONS (continued)

introduced in water treatment chemicals, catalysts, and from equipment corrosion products (stainless steel and stablizers). Phosphate rock and raw sulfur sometimes contain significant quantities of selenium, arsenic, cadmium and natural uranium. If it is believed that any of these parameters are present, they should be limited.

ABATEMENT MODELS

Phosphate Fertilizer Industry

Phosphorus, Fluoride, and Suspended Solids - Conventional treatment for waste from the phosphate fertilizer industry is to route the waste flows to an impoundment area, (gypsum pond) and then through a two-stage double liming process. The first stage neutralizes the highly acidic water to a 3-4 pH level and precipitates out some of the fluoride and phosphorus in the wastewater. The second stage further neutralizes the stream to a 6-7 pH level.

Some heavy metals precipitate out from this process, but further treatment may be necessary to reach established effluent levels.

This treatment system will meet Schedule A levels. If lower levels are required in cases where water quality is being impaired, additional treatment consists of mineral addition to secondary and tertiary treatment systems which combine flotation, sedimentation, sand and dual media filtration, and aeration.

Heavy Metals - If the heavy metals content in the effluent from the double liming process does not meet established Schedule A levels. then additional treatment will be necessary. The location of the precipitation-sedimentation system used to remove the heavy metals will depend on the waste stream being treated and the design situation. It is probably more practical to integrate this system with the double liming process or to have it follow directly behind it.

The procedure is basically the adjustment of pH, usually with lime, to achieve an alkaline condition, followed by precipitation of the hydroxide. Coagulating aids are often required to achieve the levels of precipitation necessary. Variations and individual treatments may be necessary for several of the metal ions. These variations include reduction or oxidation to different oxidation states, removal of interfering constitutents prior to precipitation, and adjustment of the pH to different levels (pH of 7 to 10).

Arsenic - The stream can be treated by adjusting the pH to around 10, adding coagulating aids, and allowing settling, followed by filtration if necessary.

ABATEMENT MODELS (continued)

Nitrogen Fertilizer Industry

Ammonia Nitrogen - Treatment methods include microbial nitrification, biological denitrification, air stripping, and steam stripping.

Stream stripping appears to be the most dependable. In stream stripping, a single tower equipped with trays or packing is used.

The waste stream enters the top of the stripper and the stripping medium, in this case steam, is introduced at the bottom of the column below the trays or packing. The ascending steam removes the free ammonia from the waste stream. The operation usually occurs in a temperature range of 230-270°F and 5-30 psig. If a dry overhead gas product is desired, a condenser may be used to remove water from the gas ; the condensed water is refluxed back to the tower-feed. The ammonia solution should be kept at a pH of 9.5 or higher.

If it becomes economically desirable to recover the ammonia or if an air pollution problem exists for a certain site location, then the overhead from the stripping tower can be recovered through the application of reflux, compression, and purification.

Nitrate Nitrogen - Good housekeeping and inplant controls are required in order to meet Schedule A limits. Off gas from the neutralizer can be vented directly to the atmosphere. In situations where this will not be allowed, the off gas must be condensed and the condensate treated to remove NH_3 and NH_4NO_3, and recycled back to the neutralizer, or concentrated and used directly as product.

For plants where the effluent does not meet Schedule A levels, and recycling and inplant modifications have been applied, additional waste treatment will be required. One treatment system which is successfully being used involves ion exchange. The essential steps in the ion exchange process are: collecting of waste in large settling ponds, filtering through anthracite coal filters to remove particulate matter , contacting wastewater with strong acid cation exchange resin that removes the ammonium cation contaminant, contacting the "decationated" water with a weak base resin in the hydroxide form with 7% ammonium hydroxide, and combining backwash from each separate unit and neutralizing excess acid with ammonia.

A dual effect evaporator system may also be used for treating waste liquors containing ammonium nitrate. (These wastes include condensed neutralizer off gas, leaks, spills,etc). The liquor is concentrated to 60-80% depending on the point of usage in the plant. The only waste discharge is steam from the evaporators and it does not constitute an air pollution problem. Significant steam economy is achieved from the dual effect evaporator design.

ABATEMENT MODELS (continued)

Organic Nitrogen - The major source of organic nitrogen in waste effluent is the production of urea. Urea production can be broken down into three categories of plants: once-through, partial recycle and total recycle.

In this case, recycle does not refer to the waste effluent, but the recycling of unreacted ammonia and carbon dioxide (ammonium carbamate is also broken down into ammonia and carbon dioxide and recycled). With once-through and partial recycle systems, there is no process effluent other than leaks and spills. On the other hand, total recycle plants have a considerable amount of effluent containing significant amounts of urea and ammonia.

In the effluent limits table (Table I) two A and B levels are given for NH_3-N and Organic N under the urea industrial category. The lower levels apply to once-through and partial recycle plants while the higher level is to be applied to total recycle facilities. A waste removal system is on the market using urea hydrolysis and steam stripping. The system is designed to give an effluent of 75 pounds ammonia nitrogen and 85 pounds organic nitrogen per 1000tons of urea production (total recycle plants). To allow for fluctuations in the system and to establish an average limit which can be met consistently, a level of 100 lbs. of ammonia nitrogen and 100 lbs. of Organic Nitrogen per 1000 tons of urea production has been set. Since ammonia is produced in the hydrolysis of urea, it would probably be more practical to apply steam stripping to the total waste stream after hydrolysis of the urea.

Heavy Metals - The precipitation-sedimentation systems described under phosphate fertilizer above apply here also. The location may depend on a number of things including the waste stream being treated and the design situation.

Oil and Grease - Where oil and grease in the waste effluent are a problem, a properly operated API-designed oil separator or the use of air flotation and skimming can reduce the oil in the effluent to meet the Schedule A levels.

SPECIAL WASTE ALLOWANCE CONSIDERATIONS

In the production of ammonia, ammonium nitrate, and urea, there are situations (absorption of ammonia in cooling water) and processes (prilling, solid materials handling) which require the consideration of additional waste allowances for certain parameters. For discussion of this see the memorandum to the Regional Permit Program Directors, dated February 16, 1973, subjected "Waste Allowances Above the Effluent Limitation Guidance Schedule A Levels for the Nitrogen Fertilizer Industry."

TABLE 1

EFFLUENT LIMITATIONS 1/

FERTILIZER INDUSTRY

Subcategory	Characteristics	Effluent Limits lbs/1000 Ton Product A	B
Sulfuric Acid Sulfur Burning	Iron	1.0	1.0
	Suspended Solids	25.0	25.0
	Vanadium	1.0	1.0
	Selenium	0.5	1.0
	Arsenic	0.25	-
Phosphoric Acid	Iron	25.0	25.0
	Suspended Solids	625.0	625.0
	Phosphorus	125.0	250.0
	Fluorine	125.0	250.0
	Heavy Metals (U-Nat,Va)	25.0	25.0
	Cadmium	5.0	25.0
Normal and Triple Superphosphate Mono-and Di-Ammonium Phosphate N-P-K	Iron	8.3	8.3
	Suspended Solids	208.0	208.0
	Phosphorous	41.5	83.0
	Fluorine	41.5	83.0
	Heavy Metals (U-Nat,Va)	8.3	8.3
	Cadmium	1.7	8.3

1/ For ammonia, ammonium nitrate, and urea see section entitled "Special Waste Allowance Considerations" on previous page.

EFFLUENT LIMITATIONS (Cont.)

FERTILIZER INDUSTRY

Subcategory	Characteristics	Effluent Limits lbs/1000 Ton Product	
		A	B
Ammonia Production Centrifugal and Reciprocal Compressors	Iron	5.3	5.3
	Nickel	2.6	5.3
	Ammonia Nitrogen	52.0	104.0
	Suspended Solids	130.0	130.0
	Oil	52.0	130.0
Ammonium Sulfate	Iron	2.0	2.0
	Nickel	1.0	2.0
	Ammonia Nitrogen	19.8	39.8
	Suspended Solids	50.0	50.0
Urea	Iron	3.2	3.2
	Nickel	1.6	3.2
	Organic Nitrogen 2/	32.0-100	64.0-100
	Ammonia Nitrogen 2/	32.0-100	64.0-100
	Oil	32.0	80.0
	Suspended Solids	80.0	80.0
	Cobalt	1.6	3.2

2/ The 32 and 64 lbs/1000 Tons Product limits are to be applied to once-through and partial recycle urea plants and the 100 lbs/1000 Tons product limit to total recycle plants.

EFFLUENT LIMITATIONS (Cont.)

FERTILIZER INDUSTRY

Subcategory	Characteristics	Effluent Limits lbs/1000 Ton Product	
		A	B
Nitric Acid	Iron	2.9	2.9
	Ammonia Nitrogen	28.0	56.0
	Nitrate Nitrogen	28.0	56.0
	Suspended Solids	72.0	72.0
	Nickel	1.4	2.9
	Cobalt	1.4	2.9
	Oil	28.0	72.0
Ammonium Nitrate	Iron	2.5	2.5
	Nickel	1.2	2.5
	Ammonia Nitrogen	25.0	50.0
	Suspended Solids	62.5	62.5
	Nitrate Nitrogen	25.0	50.0
	Oil	25.0	62.5

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INORGANIC CHEMICALS

APPLICABILITY

These instructions apply only to Standard Industrial Classification Codes 2812, 2816, and 2819.

SUBCATEGORIES CONSIDERED

The following subcategories are considered:

aluminum chloride, aluminum sulfate, chlorine - sodium hydroxide, hydrochloric acid, hydrofluoric acid, hydrogen peroxide, lime, nitric acid, elemental phosphorus, and sulfuric acid.

OPERATIONS EXCLUDED

Inorganic compounds such as anhydrous ammonia, superphosphates, and urea are included in the guidance for the fertilizer industry (SIC 2871).

APPLICATION OF LIMITATIONS

The use of the interim guidance is limited to single product plants for the ten categories covered in the interim guidance.

The effluent guidelines are based on process wastewater, i.e., that coming in contact with process materials. This does not include non-contact cooling water, cooling tower blowdown or boiler blowdown.

The mercury effluent limitation of 0.1 pounds per day for the entire chlor-alkali operation is to be measured at the outlet from the mercury treatment unit. Should there be another process at the location that has an effluent containing mercury, that stream must be treated in the mercury treatment unit and thus be included in the 0.1 pound per day. Mercury residuals (i.e., mercury picked up between the treatment unit outlet and the discharge to the stream) are frequently a problem. Where residuals are a demonstratable problem, identify the quantity of mercury involved and develop a program with schedules for correction.

ABATEMENT MODELS

The industries in these categories manufacture products from raw materials that are inorganic in nature, thereby resulting in wastewater containing a low biochemical oxygen demand, inert solids, large amounts of dissolved solids, and effluents with a wide range of pH values. The major pollutant common to nearly all of the industry is inorganic suspended solids, a parameter that can be controlled

ABATEMENT MODELS (continued)

with sedimentation basins designed for minimal short circuiting and sufficient detention time.
Total dissolved solids, chiefly chlorides and sulfates, constitute the second major class of pollutants for the inorganic industry. However, it should be noted that guidelines are not presently placed on dissolved solids, chlorides and sulfates. When the discharge of any of these parameters may be in violation of Federal or State or local water quality standards, limits will be established. When such is the case a substantial amount of dissolved solids reduction can be effected through in-plant controls some of which are:

1. Chlorine-caustic
   (a) non-contact vapor condensers.
   (b) use of indirect chlorine coolers in the chlorine compression process
   (c) collection and reuse of drying acid.
   (d) recycling of sodium chloride from the evaporators concentrating caustic soda
   (e) use of indirect vapor condensers in the brine dechlorination process
   (f) recycle of brine filter back washwater
   (g) collection and reuse of effluent from waste chlorine gas disposal system
   (h) maximum removal of brine solution from slurries resulting in precipitation of impurities from raw brine solutions
   (i) containment and recycling of spills and leaks back to the process.

2. Nitric Acid

   (a) replacement of barometric quench condensers with non-contact condensers
   (b) the use of single and double mechanical pump seals
   (c) curbing the process area with recycling of spills.

3. Hydrochloric Acid

   (a) curbing and floor sumps to collect and recycle strong acid spills and leaks.

   (b) maximizing the efficiency of the cooler and absorber to minimize the chloride wasteload from the scrubber.

ABATEMENT MODELS (continued)

4. Hydrogen Peroxide (organic method)-separation of organic solvents from the aqueous media with decanters or API separators for recycle or recovery.

5. Hydrofluoric Acid-maximize for efficiency of the acid absorbers to minimize the fluoride wasteload from ejecter scrubber systems.

6. Sulfuric Acid - curbing and floor sumps to collect and recycle spills and leaks.

Treatment models representing "Best Practicable Treatment" described for each of the product industries are described to illustrate means by which "A" levels may be achieved.

Aluminum Chloride - sedimentation and coagulation.
Aluminum Sulfate - sedimentation and recycling of clarified effluent.
Chlorine-caustic - sedimentation, chemical precipitation-coagulation-sedimentation, filtration, carbon adsorption, neutralization, water recycling, and water conservation practices.

Hydrochloric Acid - segregation of cooling water, collection of spills and leaks for recycle or land disposal.
Hydrofluoric Acid - lime precipitation, coagulation flocculation, sedimentation, and neutralization.
Hydrogen peroxide - (organic method) - Biological oxidation of organic solvents, sedimentation.
Lime - dry collection of dust.
Nitric Acid - segregation of cooling water, collection of spills and leaks for recycle or land disposal.
Phosphorus - sedimentation and recycle.
Sulfuric Acid - segregation of cooling water, collection of spills and leaks for recycle or land disposal.

B levels can be achieved by the following methods:

Aluminum Chloride - reduction of suspended solids in scrubber wastewaters which do not use alkaline solutions. Aluminum hydroxide readily flocculates and settles out
Aluminum Sulfate - lime neutralization followed by sedimentation and recycle of a portion of the effluent.
Chlorine-Caustic - separation of process water from cooling water, and water recycle will be required for both A and B levels. Soda ash or caustic treatment may be required for lead, but it generally separates out in settling ponds. Installation of metal anodes will eliminate lead.

ABATEMENT MODELS (continued)

Hydrochloric Acid -	(chlorine burning process) - caustic neutralization of acid leaks and wastewater from the scrubber. Hydrochloric acid processes are quite commonly located at the same site as caustic chlorine plants. In this case the acid wastewaters can be used to neutralize alkaline wastewaters.
Hydrofluoric Acid -	treatment with lime to a pH of 10-11. This neutralizes the sulfuric acid, reduces the fluoride content to 5 ppm and suspended solids to 25 ppm. Acidification of the effluent reduces pH to 9 or less.
Hydrogen Peroxide -	disposal of the biodegradable solvent waste, either by discharge to a municipal biological treatment system or a solvent collection and recycling system.
Lime -	discharge of wet scrubber waste to a settling pond with effluent containing 20 ppm suspended solids.
Nitric Acid -	neutralization of leakage with caustic.
Phosphorus -	phosphorus burial, lime and settling pond treatment for soluble phosphates and fluorides and dry collection of solid phosphates. A small part of the flow to the settling pond is discharged. The remainder is recycled.
Sulfuric Acid -	lime and settling pond treatment of the leaks to 25 ppm suspended solids.

LEVEL A

INORGANIC CHEMICALS, ALKALI AND CHLORINE INDUSTRY

EFFLUENT GUIDELINES

PRODUCT	FLOW BASIS* GAL/TON	LB PER TON OF PRODUCT: TOTAL SUSPENDED SOLIDS	LB PER TON OF PRODUCT: OTHER BY NOTE
ALUMINUM CHLORIDE	120	0.015	
ALUMINUM SULFATE	No waterborne process effluent		
CAUSTIC CHLORINE:**			
Diaphragm Cell	8,000	1.0	1
Mercury Cell	5,000	0.6	2
Downs Cell	7,300	0.9	-
HYDROCHLORIC ACID (Chlorine burning)	No waterborne process effluent		
HYDROFLUORIC ACID	4,672	0.6	3
HYDROGEN PEROXIDE (Organic process)	8,600	1.1	4
LIME/CALCINATION	No waterborne process effluent		
NITRIC ACID	No waterborne process effluent		
PHOSPHORUS	No waterborne process effluent		
SULFURIC ACID (Sulfur burning contact plants)	No waterborne process effluent		

pH range is 6-9 for all products

NOTES:
1. 0.04 #/ton lead
2. 0.1 #/day mercury for the entire operation without regard to capacity***
3. 0.2 #/ton fluorides
4. 0.06 #/ton TOC

*The flow basis numbers are to show how numbers were derived and are not intended as flow limitations.

**Units are per ton of chlorine production

***The EPA goal of no mercury discharge may reduce this number as it becomes practical.

LEVEL B

INORGANIC CHEMICALS ALKALI & CHLORINE INDUSTRY

EFFLUENT GUIDELINES

PRODUCT	FLOW BASIS* GAL/TON	LB PER TON OF PRODUCT: TOTAL SUSPENDED SOLIDS	LB PER TON OF PRODUCT: OTHER BY NOTE
ALUMINUM CHLORIDE	120	0.025	
ALUMINUM SULFATE	400	0.08	-
CAUSTIC CHLORINE**			
Diaphragm Cell	30,000	6.3	1
Mercury Cell	20,000	4.3	2
Downs Cell	7,300	1.5	-
HYDROCHLORIC ACID (Chlorine burning)	1,000	-	-
HYDROFLUORIC ACID	36,000	7.5	3
HYDROGEN PEROXIDE (Organic process)	8,600	1.8	
LIME/CALCINATION	200	0.03	4
NITRIC ACID	86	0.01	-
PHOSPHORUS	8,000	1.7	5
SULFURIC ACID (Sulfur burning contact process)	1,200	0.25	-

pH range is 6-9 for all products

NOTES:
1. 0.2 #/ton, lead
2. 0.1 #/day of mercury for the entire operation without regard to capacity
3. 1.5 #/ton, fluorides
4. 0.03 #/ton, COD
5. 0.2 #/ton, phosphates; 0.2 #/ton, fluorides; 0.001 #/ton, elemental phosphorus

*The flow basis numbers are to show how numbers were derived and are not intended as flow limitations.

**Units are per ton of chlorine production.

MEAT PRODUCTS

APPLICABILITY

These instructions apply only to Standard Industrial Classification codes 2011, 2013 and 2015.

SUBCATEGORIES CONSIDERED

Operations in the meat products industry are considered under the following subcategories:

Meat packing, slaughterhouse, packinghouse, and processing plant only;

Poultry Processing: broilers (eviscerating), broilers (eviscerating cut-up), fowl and duck, and turkeys.

OPERATIONS EXCLUDED

Off-site rendering plants are not included in this guidance.

PRODUCTION BASIS

The maximum daily production capacity, as determined at the time of application, shall be the highest average level sustained for seven consecutive operating days of normal production.

APPLICATION OF LIMITATIONS

Guidance should be applied only to the following categories:

Segment	Maximum Capacity
Beef Slaughter (only)	greater than 800,000 lbs lwk/day
Mixed Slaughter	greater than 100,000 lbs lwk/day
Packing Houses	greater than 100,000 lbs lwk/day
Meat Processing	greater than 10,000 lbs of product per day
Poultry Processing	greater than 40,000 lbs lwk/day

Allowable waste loads for a packinghouse may require adjustment when normal day-to-day processing is less or greater than would usually be related to the live weight kill. The following equations can be used to make this adjustment for Schedule A values. They relate BOD_5 and suspended solids effluent limitations to live weight kill and edible products where one of the above situations exists.

It should be stressed that manufactured edible products refers to such products as sausage, bacon, hot dogs, etc.

Settleable Solids - Settleable solids shall not exceed 0.1 ml/l.

APPLICATION OF LIMITATIONS (continued)

1. When a packinghouse is processing an unusually large amount of meet compared with the live weight kill (lwk):

BOD_p = 0.26 (1000 lb. lwk/day) + 0.0625[(1000 lb. mfg. edible product/day - 0.25* (1000 lb. lwk/day)]

BOD_p = Permitted lb. BOD_5

SS_p = 0.35 (1000 lb. lwk/day) + 0.083 [(1000 lb. mfg, edible product/day -0.25* (1000 lb. lwk/day)]

SS_p = Permitted lb. Suspended Solids

An example of the above is as follows:

Slaughter - 2000 thousand pounds lwk/day

Processing - 1000 thousand pounds manufactured edible product/day

BOD_p= 0.26 (2000)+ 0.0625 [(1000) - 0.25 (2000)]
= 520 + 31.3 = 551.3 lb. BOD_5

SSp= 0.35 (2000)+ 0.083 [(1000) - 0.25 (2000)]
700 + 41.5 = 741.5 lb. Suspended Solids

2. Plant processing a relatively small amount of meat.

BOD_p = 0.26 (1000 lb lwk/day) - 0.0625 [0.25*(1000 lb lwk/day)- (1000 lb. mfg. edible product/day)]

SSp = 0.35 (1000 lb. lwk/day) - 0.083 [0.25*(1000 lb. lwk/day)- (1000 lb. mfg. edible product/day)]

An example of the above is as follows:

Slaughter - 2000 thousand pounds lwk/day

Processing - 200 thousand pounds manufacture edible product/day

BOD_p = 0.26 (2000) - 0.0625 [0.25(2000) - (200)]
520 - 18.75 = 501.3 lb. BOD5

SSp= 0.35 (2000) - 0.083 [0.25(2000) - (200)]
700 - 25 = 675 lb. Suspended Solids

*Represents the fraction of lwk normally processed into edible product.

APPLICATION OF LIMITATIONS (continued)

The following may be significant parameters depending on production methods and receiving water characteristics:

Ammonia - The quantity present in treated effluent from systems using anaerobic lagoons is a potential problem. In discussion with industrial representatives this fact should be made clear so they can develop their abatement programs accordingly.

Phosphate
Dissolved Solids
Color
Turbidity
Toxicity

When deemed necessary, effluent limits applied to these parameters shall consider receiving water quality and available technology.

ABATEMENT MODELS

Meat Packing

The following process considerations and treatment facilities can be used to achieve the 'best practicable pollution control technology currently available.'

1. Efficient blood collection
2. Dry handling of paunch
3. Dry clean-up prior to wash down
4. High pressure spray system for wash down
5. Screening and grit removal
6. Dissolved air flotation
7. Anaerobic lagoons followed by aerated lagoons or activated sludge systems.
8. Disinfection

Schedule A guidance is based on effluent BOD_5 and suspended solids concentrations of 30 and 40 mg/l respectively. Processing plant concentrations are slightly lower. Wastewaters from this industry are readily amenable to biological treatment to these specified quality levels.

The Schedule B guidance represents good present-day abatement practices.

ABATEMENT MODELS (continued)

Poultry Processing

The following elements can be used to achieve the 'best practicable pollution control technology currently available' for the poultry industry.

1. Efficient blood collection
2. Dry clean-up prior to wash down
3. High pressure water spray systems for wash down
4. Reuse of chiller water in such areas as the feather flume
5. Grease removal
6. Biological oxidation by activated sludge or aerated lagoon systems.
7. Disinfection

The Schedule A effluent guidance is used based on BOD_5 and suspended solids concentrations of 20 mg/l and 30 mg/l respectively. This wastewater is readily amenable to biological treatment to the quality levels indicated. The Schedule B guidance represents good present-day abatement practices.

EFFLUENT LIMITATIONS - MEAT PRODUCTS INDUSTRY
LB/1000 UNITS

SUBCATEGORY	UNIT	SCHEDULE A		SCHEDULE B	
MEAT PACKING		BOD_5	SUSPENDED SOLIDS	BOD_5	SUSPENDED SOLIDS
Slaughterhouse	lb. lwk 1/	0.17	0.23	0.30	0.47
Packinghouse	lb. lwk	0.26	0.35	0.61	0.87
Processing Plant Only	lb. Prod.	0.26	0.26	0.32	0.42
POULTRY PROCESSING 2/					
Broilers (eviscerting)	lb. lwk	0.41	0.62	0.59	1.01
Broilers (eviscerating cut-up)	lb. lwk	0.46	0.69	0.73	1.18
Fowl & Duck 3/	lb. lwk	0.4	0.62	0.78	1.09
Turkeys	lb. lwk	0.4	0.62	0.57	0.68

1/ Live weight killed.

2/ Figures do not include rendering.

3/ For plants doing cooking, boning, and dicing, limits may be increased up to 15%.

APPLICABILITY

These instructions apply to Standard Industrial Classification Codes 3471 and 3479.

APPLICATION OF LIMITATIONS

The interim guidance should be used only for the large establishment having discharges greater than 20,000 gpd for the categories covered in the guidance.

The metals involved in the effluents discharged by this industry are in ionic form, in solution, or as part of a compound in suspended form. Limits for each parameter are given on the basis of pounds per thousand gallons. Small companies, (9 employees or fewer) may have relatively low total weight loadings of toxic discharges. However, the concentration of these discharges may be far above the levels prescribed herein. Such companies, because of their size, may not be able to meet Schedule A or even Schedule B discharge levels. Nevertheless, if exceptions were made to allow for their discharge to be permitted and guided solely by total weight basis, then the following problems would be immediately apparent:

a. The effect on receiving waters of a highly concentrated discharge of toxic materials in the vicinity of the discharge pipe.

b. The cumulative effect of concentrated toxic discharge from numerous small shops, which tend to be congregated in the same general locality.

The following are estimates[(a)] of water usage by job shops in terms of volume of business and number of employees:

Water Use (gpd)	Annual Sales ($ 1,000's)	Employees
(A) <20,000	16-145	1-9
(B) 20,000-60,000	170-485	10-30
(C) 61,000-300,000	510-1100	31-60
(D) 300,000	1100	60

The use of dilution to achieve discharge limits will not be allowed.

(a) 1967 Census of Manufacturers, U.S. Department of Commerce, Bureau of Census Publication MC 67(2) 34D.

ABATEMENT MODELS

The basic treatment model assumed herein is that of unit process stream precipitation. Some possible variations are described below. For essentially all of the parameters, best practicable control technology currently available involves precipitation which includes coagulation, sedimentation, flotation, and finally, filtration. A modified version generally regarded as more effective is known as the "Integrated Process." Evaporative recovery and ion exchange offer other effective approaches. In some cases, chemical oxidation (for cyanides) and chemical reduction (for chromium) are needed as part of the treatment process. Such heavy metals as copper, zinc, iron, manganese, nickel, chromium +3, and conceivably cobalt, can be readily and inexpensively precipitated as the hydroxides by lime treatment. Cadmium is most effectively precipitated as the sulfide; soda ash is most effective for lead.

Most of the hydroxides are precipitated at pH 9. Zinc hydroxide, being amphoteric, manifests its minimum solubility in the pH range of 8-9. Aluminum hydroxide, being amphoteric, manifests its minimum solubility over the pH range of 5-6. Depending on the kinds of heavy metal ions present in the effluent, it is possible to remove them either concurrently or in stages by precipitation techniques. The necessity for pH control and desirability of segregation of streams would be governed by the particular combination of heavy metal ions involved.

In essence, the discharge limits would apply equally as well to effluents containing one or more metals; however, in treating effluents containing a mixture of metals, compliance with the effluent guidance must be evaluated on a case-by-case basis.

It may be possible for groups of small companies in the same locality to technically and economically meet concentration effluent guidelines by placing their pollution abatement resources into centrally located treatment facilities. Some of the costs involved could be recovered by return of useful materials such as precious metals in proportion to individual input. (Cooperative arrangements of this type should be given serious consideration.)

COD should be considered because various types of organic compounds are likely to be used as components of metal finishing process baths. In addition, oil and grease are removed from working parts during pickling operations. Owing to the relatively low proportion of organics, this parameter may have limited significance in the Metal Finishing Industry. It is recommented that discharge limits be

considered individually on a case-by-case basis. In addition, such parameters as ammonia (N) and phosphate (P) should be considered similarly on an individual case-by-case basis for similar reasons. The various metals listed in the effluent limits are the most frequently encountered in the Industry.

EFFLUENT LIMITATIONS

EFFLUENT PARAMETER	SCHEDULE A Concentration mg/l (a) (b)	SCHEDULE A lbs/1000 gal	SCHEDULE B Concentration mg/l (a) (b)	SCHEDULE B lbs/1000 gal
COD (c)	-	-	-	-
TSS	10	0.0834	50	0.417
CYANIDE Dest. by Cl_2	0.03	0.00025	0.1	0.000834
FLUORIDE	18	0.150	18	0.150
ALUMINUM	0.2	0.00167	0.5	0.00417
BARIUM	1.0	0.00834	2.0	0.0167
CADMIUM	0.1	0.000834	0.2	0.00167
CHROMIUM CR^{+6}	0.05	0.000417	0.1	0.000834
CR^{t}	0.25	0.00209	0.5	0.00417
COPPER	0.2	0.00167	0.5	0.00417
IRON	0.5	0.00417	1.0	0.00834
LEAD	0.05	0.000417	0.1	0.000834
MANGANESE	1.0	0.00834	2.0	0.0167
NICKEL	1.0	0.00834	2.0	0.0167
SILVER	0.05	0.000417	0.05	0.000417
ZINC	0.5	0.00417	0.05	0.000417
pH (Ave. Daily Discharge)	6 - 9		6 - 9	

(a) Metal concentrations are based on analysis of filtered clear solutions.

(b) The maximum permissible concentration for a particular metal in the total suspended solids shall be 1 mg/l, (0.00834 lbs/1000 gal).

(c) Limited significance in this industry, should be considered on a case-by-case basis.

MINING AND MILLING

APPLICABILITY

These instructions apply to Standard Industrial Classification Codes 1011, iron ores; 1021, copper ores; 1031, lead and zinc ores; 1042, lode gold; 1043, placer gold; 1044, silver ores; 1051, bauxite and other aluminum ores; 1062, manganese ores; 1064, tungsten ores; 1069, ferroalloy ores, except vanadium, not elsewhere classified; 1092, mercury ores; 1093, titanium ores; 1094, uranium, radium and vanadium ores; and 1099, metallic minerals (ores) not elsewhere classified.

OPERATIONS EXCLUDED

All subcategories not considered are excluded.

APPLICATION OF LIMITATIONS

This guidance should only be applied in very selected circumstances in the hard rock milling industry.

The effluent limitations are expressed only in concentrations. Due to the wide variations in ore types processed in this industry a pound-per-day limitation has been found to be impractical. If significant changes in production rates or changes in ore type processed are encountered this should be reported to the Regional Administrator.

A review of such changes will be necessary to determine the appropriateness of the limits used for preparation of the permit.

EFFLUENT LIMITATIONS
SCHEDULE A

CRITERIA	RECOMMENDED LIMITS
Suspended Solids	20mg/l
Cyanide (Total)	When cyanide compounds are used in the milling process, effluent from the waste abatement system shall not exceed 0.02 mg/l.
Sulfate	The Regional Administrator or his designated representative shall establish an effluent limitation if beneficial downstream water uses are affected.
Radioactivity	Discharge concentration shall not exceed 1/10 of Bureau of Standards

MINING AND MILLING

EFFLUENT LIMITATION (continued)

CRITERIA	RECOMMENDED LIMITS
	Handbook 69 values, or such Standards as may be developed. RA-226 concentrations shall be as close to background as possible but in no case to exceed the addition of 1.0 picocurie per liter.
Iron (Dissolved)	0.5 mg/l
Manganese	0.1 mg/l

EFFLUENT LIMITATIONS
SCHEDULE B

CRITERIA	RECOMMENDED LIMITS
Suspended Solids	30 mg/l
Cyanide (Total)	When cyanide compounds are used in the milling process, effluent from the waste abatement system shall not exceed 0.03 mg/l.
Sulfate	The Regional Administrator or his designated representative shall establish an effluent limitation if benefical downstreams water uses are affected.
Radioactivity	Discharge concentrations shall not exceed 1/5 of Bureau of Standards Handbook 69 values, or such standards may be developed. Ra- 226 concentrations shall be as close to background as possible but in no case to exceed the addition of 3.0 picocurie per liter.
Iron (Dissolved)	7.0 mg/l
Manganese	1.0 mg/l

ABATEMENT MODELS

Mine Discharge

Mine discharge is commonly characterized by high acidity, and high metal and sulfate concentrations, resulting from the oxidation of sulfate minerals to form sulfuric acid and metal ions. Major reduction in the pollution caused by mine discharge can be achieved by procedures such as reducing the flow of the water to the mines, reducing the exposure of sulfide minerals to the atmosphere,

ABATEMENT MODELS (continued)

or by flooding abandoned mine working to reduce the rate of sulfide oxidation. Treatment of coal mine discharge usually takes the form of lime or limestone neutralization of free acidity, followed by sedimentation to remove the various metal hydroxides. Common treatment techniques are neutralization and sedimentation, with further metals removal by precipitation of the remaining metals as metal sulfide. This may, for example, be achieved by adding barium sulfide, resulting in the formation of a sludge which has excellent settling characteristics. The sludge can be smelted to recover the various metals. The reagent requirements are minor , as most of the metal ions are removed during the neutralization process.

Milling Discharge

Waste from milling consists of a water stream, frequently containing dissolved toxicants, acting as a carrier for ground mineral fragments. These latter usually include metal sulfides, subject to oxidation if exposed to atmospheric conditions. Other materials of concern include reagents, such as cyanide, added to the milling circuit. The mill waste generally is alkaline.

Common treatment techniques utilized by the milling industry consist of discharging the slurry into a tailings pond, with sufficient detention to reduce the suspended-sediment concentration to approximately 20 mg/l. The clarified water is then either decanted to receiving streams or, in an increasing number of cases, recycled as mill process water. The latter procedure is preferred for environmental considerations. The treatment considered in the development of the attached limits, for dishcarge to streams, consists of primary sedimentation in a tailings pond, as is currently practiced throughout the milling industry. Following sedimentation, it is anticipated that the waste will be neutralized and treated for metals removal, as in the case of mine discharge, by sulfide precipitation.

Cyanide is frequently used in milling, both to dissolve gold and to prevent flotation of pyrite. Several other, less toxic, reagents are known to function equally as well as cyanide as a pyrite suppressant, and are recommended. Cyanide often decomposes during detention in a tailings pond. If the tailings pond decant contains high concentrations of cyanide, it is anticipated that the cyanide concentration will be reduced by the use of the alkali chlorination procedure.

Combined Discharge

Many operations produce both mine discharge and mill waste. Some improvement in water quality can be achieved by introducing the mine discharge into the tailings pipe line. This results in partial neutralization of the acid mine discharge and alkaline mill waste.

ABATEMENT MODELS (continued)

Metals are removed through surface adsorption on the ground silica fragments. Where both wastes are present, it is anticipated that the two streams will be mixed, and treated as a single waste.

MOTOR VEHICLES

APPLICABILITY

These instructions were developed to apply to SIC Codes 3711, 3712, 3714, and 3461, (1967 edition).

SUBCATEGORIES CONSIDERED

Operations in the motor vehicles industry are considered under the following subcategories: casting; engine machining and assembly; stamping; body assembly; frame manufacture; electroplating of metal; and final assembly.

OPERATIONS EXCLUDED

This guidance only covers the listed operations. Other operations not listed such as aluminum casting, conversion coating, and the manufacture of springs, radiators, heaters, and transmissions are not included but must be taken into consideration.

APPLICATION OF LIMITATIONS

The interim guidance is based on fragmented data and the information base is very limited. Hence, it must be used very selectively.

ABATEMENT MODELS

Good in-plant control must be practiced to maintain waste flow and loads to the treatment facilities at the lowest possible levels to attain highest wastewater treatment efficiency.

Typical process controls that may be needed to meet permit conditions are as follows:

1. Separation of contaminated low volume waste waters from other plant waters such as cooling waters,
2. Separation of soluble oils utilized in machining or hydraulic systems from other plant waste waters,
3. Recirculation of emulsified oil systems,
4. Electrostatic painting would materially reduce the pollution load from typical body assembly or final assembly plants,
5. Non-phenol paint strippers should be employed wherever possible,
6. Reduction of drag-in to the rinsing circuit by

ABATEMENT MODELS (continued)

such means as increasing draining time, the installation of drip board or drip tanks, air jetting, tumbling, or vibrating the pieces,

7. Curtailment in waste usage by such expedients as countercurrent rinsing, the use of sprays, better control of water flow, proper racking and proper maintenance of racks, tanks, etc.
8. Segregation of nontoxic wastewaters from the normal toxic waste streams,
9. Prevention of leaks, overflows, and spills, and
10. Provisions for impounding these if they should occur by standby tanks, sumps, etc.

EFFLUENT LIMITATIONS - MOTOR VEHICLE INDUSTRY

SUBCATEGORY	EFFLUENT CHARACTERISTICS	SCHEDULE A lbs/unit*	SCHEDULE B lbs/unit*
Casting[1]			
	Total Suspended Solids	.0834	.29
	Phenol	.0008	.008
	Total Iron	.0025	.025
	Oil and Grease	.04	.08
Engine Machining and Assembly			
	Total Suspended Solids	.0125	.07
	Oil and Grease	.00625	.02
	Zinc	.0006	.002
	Total Chromium	.00006	.001
	Copper	.00004	.0006
	Phenol	.000125	.002
	Phosphate (P)	.00125	.01
Stamping			
	Total Suspended Solids	.0142	.06129
	Oil and Grease	.007	.0175
	BOD_5	.0142	.0437
	Zinc	.0007	.00175
	Total Chromium	.00007	.0009
	Phosphate (P)	.00142	.0088
Body Assembly			
	Total Suspended Solids	.05	.26
	Oil and Grease	.025	.073
	BOD_5	.05	.18
	Phosphate (P)	.005	.04
	Total Chromium	.00025	.004

1/ Represents the use of dry air pollution control devices. These values may be multiplied by a factor not to exceed 10 where wet air pollution control equipment must be employed.

EFFLUENT LIMITATIONS - MOTOR VEHICLE INDUSTRY (Cont.)

SUBCATEGORY	EFFLUENT CHARACTERISTICS	SCHEDULE A lbs/unit*	SCHEDULE B lbs/unit*
Frame Manufacture			
	Total Suspended Solids	.008	.035
	Oil and Grease	.004	.01
	Phenol	.00008	.001
	Phosphate	.0008	.005
	BOD_5	.008	.025
Electroplating of metal			
	Copper	.003	.075
	Nickel	.04	.250
	Cyanide	.0025	.0063
	Total Chromium	.005	.125
	Total Iron	.03	.75
	Oil and Grease	.50	2.5
	Zinc	.05	.25
	Total Suspended Solids	1.0	8.76
Final Assembly			
	Total Suspended Solids	.008	.056
	Oil and Grease	.004	.0167
	BOD_5	.008	.04
	Total Chromium	.00004	.00083
	Phosphate (P)	.0008	.0083

*The units of production are:

Casting	Ton Metal Cast
Engine Machining and Assembly	Engine
Stamping	Thousand Sq. Ft. Metal Stamped
Body Assembly	Body
Frame Manufacture	Frame
Plating	Thousand Sq. Ft. Plated
Final Assembly	Body

The above limits are based upon the following process water usage:

	A	B
Casting (gal/ton metal cast)	1000	1000
Engine Machining and Assembly (gal/engine)	150	240
Stamping (gal/1,000 sq. ft.)	170	210
Body Assembly (gal/body)	600	875
Frame Manufacture (gal/frame)	100	125
Electroplating (gal/sq. ft)	12	30
Final Assembly (gal/body)	100	200

PETROLEUM REFINING

APPLICABILITY

These instructions apply to Standard Industrial Classification Code 2911.

SUBCATEGORIES CONSIDERED

Operations in the petroleum refining industry are divided into five classifications which recognize varying degrees of processing complexity. They are: (A) Crude topping; (B) Topping and cracking/reforming; (C) Topping and cracking and petrochemicals; (D) "B" category and lube oil processing; (E) "D" category and petrochemicals.

OPERATIONS EXCLUDED

"Petrochemicals" excludes all first generation conventional refinery-associated production such as BTX, alkenes, alkynes, and other miscellaneous items such as hydrogen, sulfur, coke or carbon black and ammonia. To qualify as a class "C" or "E" refinery, intermediate chemical manufacture must be shown, including such typical products as cumene, phthalic anhydride, alcohols, ketones, trimer (nonene), and styrene.

Lube oil processing excludes formulating blended oils and additives. It requires production of blending stocks via such operations as dewaxing, lube hydrotreating, and clay treatment.

APPLICATION OF LIMITATIONS

If it is necessary to issue permits during the interim before effluent limitations guidelines are proposed, we recommend that concentration schedule (A) be applied to all refineries practicing recycle. Refineries using saline or brackish water for process should be considered on an individual basis. This guidance applies only to those refineries with greater than 10,000 bbl/day production capacity, except in Class D where it includes all refineries.

Substantial deviations from the definition under each of the refinery classification categories should be accommodated by adjusting the waste load assignments for a particular plant.

The effluent limitations shown for A & B levels are expressed in pounds per thousand barrels (lb/1000 bbl) of crude or other feedstocks processed.

APPLICATION OF LIMITATIONS (continued)

Significant differences in water use practices, and hence effluent volume, exist between refineries. The underlying reasons include age of the plant, process employed, and water availability, to mention a few.

The greatest single difference is that of one-time water use and discharge versus direct or indirect air cooling and recycle. Once-through cooling water where direct process contact (i.e. barometric) is not involved, is excluded from consideration in determining effluent limitations. Relative to 'best practicable' treatment, one-time water use in direct process contact represents a necessary consideration in determining effluent limitations, relative to a similar refinery which, by virtue of age or technology, etc., practices water recycle. Additional information is presented in order to assist in making these engineering judgements.

Table I shows effluent limitations applicable to the major categories of refineries, as described. Table II shows effluent limitations applicable to those refineries within the major categories practicing water reuse via direct or indirect air cooling and recycle.

Refineries in which direct contact (barometric) cooling water is cooled via cooling towers and recycled are to be categorized as practicing water reuse (Table II). All blowdown from such towers must be included (via treatment) in effluent accounted against the limitation.

Once-through cooling water that does not come in direct contact with petroleum materials (shell and tube heat exchangers) discharging into segregated sewers is to be excluded from effluent accounted against the limitation of the refinery categorized as practicing water reuse (Table II) on the basis of process and other contaminated wastewaters. Treatment of such cooling water for such quantities of process material as may ordinarily or commonly be leaked into the cooling water is not deemed 'practicable' for the following reasons:

1. The large volumes of water relative to the pollutant leakage result in concentrations so low as to produce dubious analytical results.

2. Unless a specific violation of water quality standards results, such low concentrations would not ordinarily be expected to have a significant adverse impact on the receiving water.

3. In the absence of a significant adverse impact on the receiving water, the benefit of treating such large quantities of water does not justify the cost, i.e., such treatment is not 'practicable'.

APPLICATION OF LIMITATIONS (continued)

Other considerations to be taken into account in the application of this guidance are discussed under "special considerations."

ABATEMENT MODELS

The treatment required for industrial wastes should include "good industrial practice" and tight process control must at least equal the level of treatment required for municipal sewage.

The treatment results should be translated into allowable discharge loads in terms of "pounds per day" for each of the contaminants, taking into account the capacity and processing complexity employed in a refinery.

Treatment models representing "best practicable treatment" illustrate the means by which "A" level requirements may be met. The unit operations may vary in hydraulic order and relative size and importance according to the needs of a specific refinery.

In developing these limitations, two possible treatment system models were used, one physical/chemical, the other biological. Biological treatment methods are generally satisfactory in removing the major contaminants from the wastewater. Before biological treatment, some pre-treatment steps such as removal of high concentrations of hydrogen sulfide, ammonia, and oil may be required. Biological systems are sensitive to shock loads which can be overcome with good plant operation and/or equalization ponds.

Physical/chemical systems normally involve the use of sand filters and activated carbon. The advantages of these systems are that shock loads do not greatly affect their performance, they are flexible and can easily be added to, and they occupy about 1/7 the land that a biological system needs.

Ammonia nitrogen can be removed by stripping or by selective ion exchange. The cost of an activated carbon system is approximately the same as that of a biological system. Two major refineries have physical/chemical systems in development or under construction. General applicability to refinery effluent remains to be demonstrated.

Physical/Chemical

1. API Oil Separators
2. Chemical Coagulation and Clarification
3. pH Control
4. Sand or dual media Filters

ABATEMENT MODELS (continued)

5. Chromate removal system
6. Ammonia stripper or ion exchange
7. Carbon adsorbers
8. Carbon reactivation system

Biological

1. API Oil Separators
2. Equalization
3. Sour Water Stripping
4. Dissolved Air Flotation
5. Biological Oxidation, using aerated lagoons or activated sludge
6. Secondary Clarification
7. Chromate Removal System
8. Sand or dual media Filters

SPECIAL CONSIDERATIONS

Socio/economic impact is an important consideration when reviewing water pollution abatement programs and compliance schedules for a given refinery. In applying this effluent guidance, it must be recognized that the costs of achieving incremental improvements in effluent quality and therefore, economic impact, will vary widely among individual refineries. Factors which could influence the relative cost of various waste treatment alternatives include:

Availability of land: If it has access to a large land area, a refinery can install long-residence time lagoons and/or activated sludge treatment facilities to achieve satisfactory removals. A land-short refinery may be unable to do so.

Types of crude oils and products: The composition of the crude oil and the types of raw materials and process materials affect the raw waste load production, as does the final product mix.

Once-through cooling water: Factors that can affect cost-effectiveness include location, existing tubular heat exchange capacity, water temperature, availability of suitable makeup water, and the like.

Refinery complexity: The refinery classification system may tend to overstate or understate the raw waste load potential of certain unusual processing configurations.

Refinery Age and Layout: Problems, particularly in older refineries, may be encountered with segregation of process, cooling, boiler house, storm, sanitary, and other waters to meet proposed effluent limitations.

SPECIAL CONSIDERATIONS

Climate and geographical location: Low ambient temperature inhibits biological treatment, and high annual rainfall complicates water handling.

Available resources needed to accomplish such programs: If an approved pollution abatement program should entail major modifications to in-plant process units which would result in extended shutdown time and loss of production for either the process unit affected or the refinery, the reviewer should adjust the compliance schedule so that shutdowns will coincide with normal and reasonable refinery turnaround and inspection schedules. Examples include major changes to on-line process piping and heat exchangers.

EFFLUENT LIMITATIONS

TABLE I

(Pounds of Pollutant per 1000 bbl/Stream Day)

Refinery Class	NH_3 (N)	TOC (1)	BOD_5	COD	Cr^{+6}	Cr^t	O&G	Phenol	Sulfide	TSS
A	1.6	4.0	2.5	15.3	0.0008	0.041	1.66	0.017	0.028	3.3
B	3.3	8.0	5.0	30.6	0.0017	0.083	3.34	0.033	0.057	6.6
C	4.1	11.6	7.3	44.6	0.0021	0.104	4.18	0.042	0.071	8.3
D	5.0	16.0	10.0	61.0	0.0025	0.125	5.00	0.050	0.085	10.0
E	7.5	27.0	16.8	102.9	0.0038	0.187	7.50	0.075	0.128	15.0

(1) TOC is shown as a possible organic monitoring parameter. Either TOC or TOD may be used for estimating BOD, using an agreed correlation factor for the refinery.

TABLE II

Effluent Limitations (BPCTCA)
Recycle-Air Cooling Subcategory
(Pounds Per 1,000 b/sd Capacity)

Refinery Class	NH_3 (N)	TOC	BOD_5	COD	Cr^{+6}	Cr^t	O&G	Phenol	Sulfide	TSS
A	1.0	2.4	1.5	9.2	0.0005	0.025	0.99	0.010	0.017	2.0
B	2.2	5.2	3.3	19.9	0.0011	0.054	2.17	0.021	0.037	4.3
C	1.9	5.3	3.4	20.5	0.0009	0.048	1.92	0.019	0.033	3.8
D	3.9	12.5	7.8	47.6	0.0019	0.098	3.90	0.039	0.066	7.8
E	2.9	10.5	6.6	40.0	0.0014	0.073	2.93	0.029	0.049	5.9

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APPLICABILITY

These instructions apply to Standard Industrial Classification Codes 2821, 2823, and to some extent to 2851 and 2891 (Epoxy Resins).

SUBCATEGORIES CONSIDERED

The following subcategories are considered:

Polyvinyl acetate resins, polypropylene resins, urethane resins, polyethylene-low density, cellulose acetate fibers and resins, cellulose triacetate fibers, polyacetal resins, nylon resins and fibers, phenolic resins, polyvinyl alcohol resins, ABS and SAN resins, acrylic resins and fibers, polyester resins and fibers, cellophane, rayon fibers, urea plastics, melamine plastics, epoxy resins, polyethylene-high density, and polyvinyl chloride resins.

OPERATIONS EXCLUDED

All subcategories not considered are excluded.

APPLICATION OF LIMITATIONS

The guidance in this industry should be used only for those dischargers that can be handled on a building block approach in the categories covered with the guidance document.

Waste from several different plants (nylon, polyethlyene, polystyrene, etc.) may all go to the same waste treatment system. Assume an "additive" approach for applying the effluent limitations. A weighted average based on production levels for each of the plants is to be used in applying each of the effluent limits.

This type of an approach will have to be used for all of the limited constituents as well as BOD and COD.

The BOD and COD Schedule-A limits represent a 4-5/1 COD/BOD ratio for the treated effluent. In certain cases this ratio may be higher (Acrylic Resins and fibers, PVC Resins, Phenolic Resins, PVA Resins and Epoxy Resins). If the biological system which is used can meet the Schedule A BOD limit, but cannot meet the Schedule A limit for COD, then some flexibility may have to be used. Depending on what constituents of the remaining COD are left after the waste treatment, a decision will have to be made as to the need for further treatment.

OTHER LIMITATIONS

Process wastes from the Plastic Materials and Synthetics Industry contain BOD5, COD, suspended solids, oil, monomers, and/or raw materials, and chemicals used in initiators (sulfates), solvents, (xylene, acetone toluene, etc), modifiers (dodecyl mercaptans), inhibitors (hydroquinone), plasticizers (phosphate), and polymerizing catalyst (boron fluoride). Utility blowdown wastes include suspended solids, phosphorus, zinc, chromium, and free chlorine. Parameters such as iron, vanadium, nickel, cobalt, titanium, aluminum, chromium, lithium, molybdenum, and cyanide are introduced in water treatment chemicals, catalysts, and from equipment corrosion products (stainless steel and stabilizers). If it is believed that any of these parameters are present, they should be limited.

Suspended solids for the glass reinforced polyvinyl acetate or polyester resin, or any other glass reinforcing industry, should be kept as low as possible because of the adverse effect the glass particles have on fish and other aquatic animals (TSS should be 10 mg/l).

ABATEMENT MODELS

Removal of BOD_5, COD, and suspended solids

The basic model wastewater treatment system includes chemical coagulation and settling followed by a biological treatment system (usually completely mixed activated sludge). Because of variations in the waste stream of the industrial categories, certain pretreatments may have to be made prior to biological treatment. The system will basically be the same as that described below.

The primary treatment method (flocculator-clarifier system) consists of chemical coagulation and settling. A coagulant which gives good results is the salt of the ferric ion. A good coagulant aid is a slightly cationic to non-ionic polyelectrolyte. Settling is then used for solids removal. At this point, toxicity tests are run to see if any of the constituents in the waste are toxic to micro-organisms to be used in the secondary treatment system.

The secondary treatment system which provides good waste removal is the completely mixed activated sludge process.

This process has proved to be highly efficient and more capable of withstanding shock loadings. Phosphoric acid and ammonia provide the supplemental nutrients; equalization also has to be provided to achieve maximum removal efficiency. In using nutrients for biological systems, nitrogen and phosphorus

ABATEMENT MODELS (continued)

levels of the effluent should be kept to 10 and 5 ppm respectively. Some flexibility may have to be used in this regard.

For very high influent concentrations, multiple biological systems may be needed.

By preceding the activated sludge system with a trickling filter or following it with a stabilization pond or polishing lagoon, necessary removals for BOD, COD and suspended solids can be achieved.

Heavy Metals

The location of the precipitation-sedimentation system used to remove heavy metals will depend on the waste stream being treated and on the design situation. Some of the possibilities would include integration with the primary system, placement of the system preceding the biological system (if toxicity tests show the need for removal at this point), or following the activated sludge system or other biological treatment method used. Generally, the closer the removal system is to the source (process) the more effective the removal.

The models for removing heavy metals are basically the same in each case and include adjustment of pH, usually with lime, to achieve the alkaline condition, followed by precipitation of the hydroxide. Coalgulating aids are often required to achieve the levels of precipitation necessary. Variations and individual treatments may be necessary for several of the metal ions. These variations should include reduction or oxidation to different oxidation states, removal of interferring constituents prior to precipitation, and adjustment of the pH at different levels.

Oil and Grease

The biological system described for removing BOD will effectively remove oil from effluents down to a range of 5-10 ppm. Coagulation-precipitation methods using coagulating aids can also effectively remove emulsified oil to the range of 5-10 ppm.

Phenols

Activated sludge systems, as described above, effectively remove phenols from waste streams. Systems using activated sludge with nutrients, preceded by trickling filters, have achieved 99.9+% removal of phenol. Levels of 0.01 ppm have been reached; this is more than adequate to reach the Schedule A levels.

ABATEMENT MODELS (continued)
Other Parameters

Cyanide

Where free cyanide may be a problem, as in the production of acrylonitrile (hydrogen cyanide is used), reduction of cyanides in effluent streams is by destruction by chlorination. This system consists of oxidation of the cyanide to cyanate with chlorine or sodium hypochlorite at pH of 10 or higher. The cyanate can be oxidized to carbon dioxide and nitrogen through additional chlorination or by acid hydrolysis.

Organic Nitrogen

This parameter could be a problem in the effluent streams for acrylic fiber and resin, nylon, and urea or melamine plastic plants. Organic nitrogen in the form of urea can be treated by hydrolizing the urea to ammonia with biological or chemical treatment. If necessary, the ammonia can then be removed by steam stripping.

Other Treatment Process

Other methods are being used for certain wastewater streams which have exceptionally high influent concentrations of BOD and COD or that have waste waste constituents which may interfere with biological treatment. One such method is fluidized-bed incineration. In applying this method to waste from the paint (including phenolic and epoxy resins) and plastics (polyvinyl chloride and polystyrene) industries, the COD concentrations in the scrubber effluent(the only liquid waste) ranged from 8 to 24 mg/l.

This effluent can be recycled to the scrubber continuously and incinerated concurrently with the other waste.

EFFLUENT LIMITATIONS

PLASTICS AND SYNTHETICS INDUSTRY

SUBCATEGORY	CHARACTERISTICS	lbs/1000 lbs Product	
		Level A	Level B
Polyvinyl Acetate Resins	BOD_5	0.38	1.0
	COD	1.88	3.12
	Suspended Solids	0.38	1.0
Polypropylene Resins	BOD_5	0.62	1
	COD	3.00	4
	Suspended Solids	0.62	2
	Vanadium	0.021	
	Titanium	0.042	
	Aluminum	0.021	
Polypropylene Fiber - No Waste Water			
Urethane Resins - No Waste Water			
Polyethelene - Low Density (ICI Process-0_2 Catalyst)	BOD_5	0.21	1
	COD	1.06	2
	Suspended Solids	0.26	1
Polystyrene Resins	BOD_5	0.19	0.60
	COD	0.87	1.0
	Suspended Solids	0.24	1.0
	Iron	0.01	
	Aluminum	0.01	
	Nickel	0.005	
	Total Chromium	0.001	0.005
Cellulose Triacetate Fibers	BOD_5	0.90	3.0
	COD	3.12	5.0
	Suspended Solids	0.90	3.0

EFFLUENT LIMITATIONS

PLASTICS AND SYNTHETICS INDUSTRY

SUBCATEGORY	CHARACTERISTICS	lbs/1000 lbs Product	
		Level A	Level B
Polyacetal Resins	BOD_5	1.38	1.38
	COD	6.90	6.90
	Suspended Solids	1.38	1.38
Nylon Resins	BOD_5	1.30	4.0
	COD	6.50	8.0
	Suspended Solids	1.30	3.0
	Phenols	0.008	
Nylon Fiber	BOD_5	0.83	1.0
	COD	4.2	4.2
	Suspended Solids	1.10	2.0
Phenolic Resins	BOD_5	0.38	2.0
	COD	1.90	10.0
	Suspended Solids	0.38	0.5
	Phenols	0.0024	
Polyvinyl Alcohol Resins	BOD_5	0.38	0.38
	COD	1.90	1.90
	Suspended Solids	0.38	0.38
ABS, SAN Resins	BOD_5	0.46	1.5
	COD	2.36	3.0
	Suspended Solids	0.46	1.5
	Total Chromium	0.0016	
	Iron	0.016	
	Aluminum	0.016	
	Nickel	0.008	
	Cyanide	0.0008	

EFFLUENT LIMITATIONS

PLASTICS AND SYNTHETICS INDUSTRY

SUBCATEGORY	CHARACTERISTICS	lbs/1000 lbs Product Level A	Level B
Acrylic Resins and Fibers	BOD_5	0.78	4.0
	COD	5.22	6.0
	Suspended Solids	0.78	1.0
	Cyanide	0.0015	
	Heavy Metals (Metal Salt bath for fiber)	0.01	
Polyester Resins and Fibers (Alkyd Resins)	BOD_5	0.62	1.0
	COD	3.00	4.9
	Suspended Solids	0.62	0.7
	Heavy Metals (Catalyst)	0.031	
Cellophane	BOD_5	10.1	20
	COD	50.0	50
	Suspended Solids	10.1	50
Rayon Fibers	BOD_5	4.5	15
	COD	22.5	40
	Suspended Solids	4.5	24
	Zinc	0.15	
Urea Plastics	BOD_5	0.055	0.055
	COD	0.27	0.27
	Suspended Solids	0.055	0.055
	Organic Nitrogen1/	0.0144	0.0144
	Nickel - Stab.	0.0009	0.0009
	Cobalt - Stab.	0.0018	0.0018

1/ As Urea

EFFLUENT LIMITATIONS

PLASTICS AND SYNTHETICS INDUSTRY

SUBCATEGORY	CHARACTERISTICS	lbs/1000 lbs Product	
		Level A	Level B
Melamine Plastics	BOD_5	0.040	0.040
	COD	0.20	0.20
	Suspended Solids	0.04	0.04
	Organic Nitrogen[1]/	0.01	0.01
Epoxy Resins	BOD_5	0.11	0.11
	COD	0.54	0.54
	Suspended Solids	0.09	0.09

1/ As Urea

EFFLUENT LIMITATIONS

PLASTICS AND SYNTHETICS INDUSTRY

SUBCATEGORY	CHARACTERISTICS	lbs/1000 lbs Product			
		Level A		Level B	
		Solution Process	Polyform Process	Solution Process	Polyform Process
Polyethylene, High Density (Ziegler (z), Phillips (P), or Indiana (I) Process)	BOD_5	0.59	0.044	1.0	1.0
	COD	2.90	0.22	2.90	2.0
	Suspended Solids	0.67	0.05	1.0	1.0
	Total Chromium	0.003	0.0002	0.015	0.001
	Vanadium (Z)	0.03	0.002		
	Titanium (Z)	0.06	0.004		
	Aluminum (Z,P)	0.03	0.002		
	Molybdenum (I)	0.03	0.002		
		Level A		Level B	
		With Acetic Acid Recovery	Without Acetic Acid Recovery	With Acetic Acid Recovery	Without Acetic Acid Recovery
Cellulose Acetate Resins	BOD_5	4.4	0.78	6.0	6.0
	COD	14.1	2.58	14.1	10.0
	Suspended Solids	4.3	0.78	6.0	6.0
		Level A		Level B	
		With Acetone Recovery	Without Acetone Recovery	With Acetone Recovery	Without Acetone Recovery
Cellulose Acetate Fibers	BOD_5	4.6	0.50	4.6	4
	COD	15.6	2.70	15.6	5
	Suspended Solids	4.6	0.50	4.6	4

EFFLUENT LIMITATIONS

PLASTICS AND SYNTHETICS INDUSTRY

SUBCATEGORY	CHARACTERISTICS	lbs/1000 lbs Product			
		Level A		Level B	
		Suspension & Solvent Process	Emulsion Process	Suspension & Solvent Process	Emulsion Process
Polyvinyl Chloride Resins	BOD_5	0.45	0.16	2.0	2.0
	COD	2.25	0.82	4.0	4.0
	Suspended Solids	0.45	0.16	1.0	1.0

PULP AND PAPER

APPLICABILITY

These instructions apply to Standard Industrial Classification Codes 2611, 2621, and 2631.

SUBCATEGORIES CONSIDERED

Operations in the pulp and paper industry are considered under the following subcategories: Kraft pulping and manufacture of coarse paper and liner board, newsprint, bleached and unbleached grades, bleached grades; Sulfite pulping and the manufacture of paper and dissolving pulp; Neutral sulfite semi-chemical, groundwood pulping and manufacturing of unbleached and bleached grades; Deinking mills; Waste Paperboard (no deinking); and Paper manufacture from purchased pulp (coarse, fine, book, and tissue).

PRODUCTION BASIS

The maximum daily production, in air-dry tons, (as determined at the time of application) shall be the highest average level sustained for seven consecutive operating days of normal production.

APPLICATION OF LIMITATIONS

The guidance with the mandatory requirement of suspended solids limitation may be used. The guidance should not be applied to the following categories:

Segment	Maximum Capacity
Acid Sulfite (paper grade)	less than 200 T/D
Waste Paperboard	less than 100 T/D
Tissue from Purchased Pulp	less than 50 T/D
Fine Paper from Purchased Pulp	less than 200 T/D
NSSC	All
Integrated Kraft with NSSC	All

Speciality Mills should be handled on a selective basis.

EFFLUENT LIMITATIONS

Settleable Solids - Settleable solids shall not exceed 0.1 ml/l.

The following may be significant parameters depending on production methods and receiving water characteristics:

Color
Turbidity
Foam
Phenol
Ammonia
Sulfite Waste Liquor

ABATEMENT MODELS

The following production process controls and treatment systems are a model for attaining the recommended effluent limitations in Schedule A:

1. Heat and/or chemical recovery from pulping liquors, efficient save-alls within the paper making process, and a high degree of water reuse,

2. primary clarification,

3. biological oxidation using aerated lagoons or activated sludge,

4. secondary clarification,

5. disinfection, if necessary.

The system described above is a generalized model which is applicable to the entire industry.

The treatment model for tissue mills, using purchased pulp, is based on an expected effluent quality from efficient physical or physical-chemical treatment. The majority of the BOD in this wastewater is associated with fibrous materials and thus is amenable to this type of treatment. The application of biological oxidation to this wastewater would not significantly lower the effluent BOD. The wastewater is also nutrient deficient and, therefore, subsequent nutrient additions to support a biological system would result in an additional loading on the receiving water.

The effluent limits given in Schedule B are based on existing facilities and are the levels which the industry should be achieving today.

PULP AND PAPER

EFFLUENT LIMITATIONS

PRODUCTION PROCESS	LB. OF SUSPENDED SOLIDS PER TON OF PRODUCT	
	Schedule A	Schedule B
I. KRAFT PULPING AND MANUFACTURE OF:		
Coarse Paper and Liner Board	5	5
Newsprint	6	6
Bleached & Unbleached Grades	10	10
Bleached Grades	10	10
II. SULFITE PULPING AND THE MANUFACTURE OF:		
Paper	20	20
Dissolving Pulp	20	20
III. NEUTRAL SULFITE SEMI-CHEMICAL	8	15
IV. GROUNDWOOD		
Unbleached	5	9
Bleached	9	10
V. DEINKING MILL	12	15
VI. PAPERBOARD (No Deinking)	3	5
VII. PAPER MANUFACTURE (From Purchased Pulp)		
Coarse	3	5
Fine (< 8% filled)	7	8
Book (> 8% filled)	4	15
Tissue	6	6

NOTES: (1) Groups I, II, III, and IV apply to integrated mills (combined pulping and papermaking operations).

(2) Groups V and VI refer to wastepaper processing plants.

EFFLUENT LIMITATIONS

PRODUCTION PROCESS	LB. OF BOD_5 PER TON OF PRODUCT	
	Schedule A	Schedule B
I. KRAFT PULPING AND THE MANUFACTURE OF:		
Coarse Paper and Liner	5	6
Newsprint	5	8
Bleached & Unbleached Grades	9	10
Bleached Grades	11	12
II. SULFITE PULPING AND THE MANUFACTURE OF:		
Paper	35	40
Dissolving Pulp	60	80
III. NEUTRAL SULFITE SEMI-CHEMICAL	14	25
IV. GROUNDWOOD		
Unbleached	2.5	5
Bleached	4.5	6
V. DEINKING MILL	10	25
VI. PAPERBOARD (No Deinking)	3	5
PAPER MANUFACTURE (From Purchased Pulp)		
Coarse	2	5
Fine (< 8% filled)	6	6
Book (> 8% filled)	3	6
Tissue	8	8

NOTES: (1) Groups I, II, III, and IV apply to integrated mills (combined pulping and papermaking operations).

(2) Groups V and VI refer to wastepaper processing plants.

APPLICABILITY

These instructions apply to Standard Industrial Classification Code 2062, RAW CANE SUGAR, i.e., those facilities which manufacture raw sugar, molasses, and cane syrup from sugar cane.

OPERATIONS EXCLUDED

For guidance on facilities refining raw sugar see the separate document on Cane Sugar Refining (SIC 2062).

PRODUCTION BASIS

Daily production shall be expressed in tons per day of gross cane, and is the highest average production sustained over 20 days of normal operation. (For a cane factory and refinery at the same site, the permitted discharge per day shall be the total of the permitted factory and refinery waste loads, but only if both are operating concurrently).

APPLICATION OF LIMITATIONS

The guidance should be utilized selectively since the data is based on continental operations.

The following may be significant parameters depending on production methods and receiving water characteristics:

Color
Turbidity
Temperature
Nitrogen
Phosphorous
Ammonia

Settleable Solids - Settleable solids shall not exceed 0.1 ml/l.

ABATEMENT MODELS

The following waste management system represents the model used to develop the effluent limitations recommended for the raw cane sugar industry as shown in Schedule A:

1. Cane wash water recycling with removal of wash solids, and/or long-term impoundment/aeration/stablization of cane wash waters during and beyond the grinding campaign;
2. Segregation, impoundments and/or possible reuse of general plant and chemical wastewater;

ABATEMENT MODELS (continued)

3. "Dry" recovery and disposal of filter muds;
4. Recycling of condenser waters (including cooling as necessary) for use in cane wash, condensers and other needs;
5. Prevention of organic entrainment carry-over from the evaporators and pans by providing adequate equipment and operational control;
6. Elimination and/or special handling of extraneous discharge, especially nondescript drains, from refuse storage piles, factory yards, washing of trucks, railroad cars, tanks, etc;
7. Separate handling, disposal and/or reuse of bagasse and trash;
8. Treatment of scrubber effluents from air pollution control devices for removal of pollutants.

The waste characteristics of cane sugar factories lend themselves to physical and biological treatment. A thorough analysis of the process operations and waste water flows and characteristics coupled with proper design inplant modifications, water reuse and wastewater treatment facilities, will achieve the recommended effluent levels.

EFFLUENT LIMITATIONS

Parameter	lb/ton Gross Cane (1) Processed	
	Schedule A	Schedule B
BOD_5	0.5	1.0
Suspended Solids	0.5	1.0

NOTES:

(1) Gross cane is defined as field cane incoming to the factory.

STEEL

APPLICABILITY

These instructions apply to Standard Industrial Classification Code 3312. The effluent limits were developed separately by subcategory and may be applied irrespective to other subcategories.

SUBCATEGORIES CONSIDERED

Subcategories are coke manufacture, iron manufacture, steel manufacture, hot forming, pickling, cold rolling sheet and strip (recirculation), cold rolling sheet and strip (direct application), tin plate and chromium-coated steel, and other coatings.

APPLICATION OF LIMITATIONS

The interim guidance should be used only for carbon steel integrated facilities.

The effluent limitations are process weight limits and were developed on the basis of the actual process water needed in each of the listed operations. The treatment levels (A and B) are values to be applied to each operation after treatment and prior to mixing with other process wastewater or cooling water. The calculations for each operation can be made separately and the values accumulated for all operations to evaluate the adequacy of treatment facilities and/or control technology.

The basis for the development of the effluent limits is treatment models described in the support document; "Basis For The Development of Effluent Guidelines For The Carbon Steel Industry".

STEEL

TREATMENT MODELS

SUBCATEGORY	SCHEDULE A	SCHEDULE B
Coke Manufacturing	Dephenolizer Solvent Extraction Biological	Dephenolizer Solvent Extraction
Iron Manufacturing	Recycle and Blowdown Treatment	No green coke "Fines Free" limestone
Steel Manufacturing	Recycle and Blowdown Treatment	"Fines Free"limestone
Pickling	Neutralization Precipitation Chemical Treatment Flocculation Clarification Acid Regeneration	Neutralization
Cold Rolling (Recirculating Oil)	Emulsion Breaking Recirculation Skimming Air Flotation Magnetic Separation Biological	Emulsion Breaking Recirculation of Oil
Cold Rolling Direct Application	Settling Emulsion Breaking Air Flotation Chemical Treatment Skimming	Settling Air Flotation Skimming
Tinplate and Chromium Plating	(Cr) Ion Exchange Air Flotation Chemical Treatment Flocculation Settling Basin	Settling Air Flotation Skimming
Other Coatings	Segregation and Separate Treatment	Terminal Treatment

EFFLUENT LIMITATIONS

SUBCATEGORY	EFFLUENT CHARACTERISTICS	TREATMENT LEVEL A lbs/ton	TREATMENT LEVEL B lbs/ton
Coke Manufacturing	Ammonia (N)	.2	.3
	Cyanide	.005	.01
	Phenol	.0002	.1
Iron Manufacturing	Suspended Solids	.09	.9
	Ammonia (N)	.1	.2
	Cyanide	.006	.02
	Phenol	.005	.01
Steel Manufacturing	Suspended Solids	.02	.06
Hot Forming	Suspended Solids	.1	1.8
	Oil & Grease	.1	.9
Pickling	Suspended Solids (1)	.025	.075
	Iron, Dissolved (1)	.002	.006
	Chloride (2)	3	16
	Sulfate (2)	7	50
Cold Rolling			
Sheet & Strip			
(Recirculating Oil)	Suspended Solids	.04	.5
	Iron, total	.02	.25
	Iron, Dissolved	.002	.012
	Oil & Grease	.016	.2

(1) "A" level is based on flow of 200 gal/ton-variations in process may require a flow up to 600 gal/ton but not to exceed an "A" suspended solids number of 0.075 #/ton or a dissolved iron number of 0.006 #/ton.

(2) Batch pickling is not included in this guidance.

EFFLUENT LIMITATIONS

SUBCATEGORY	EFFLUENT CHARACTERISTICS	TREATMENT LEVEL A lbs/ton	TREATMENT LEVEL B lbs/ton
Cold Rolling Sheet & Strip (Direct Application)	Suspended Solids	.2	.3
	Oil & Grease	.06	.1
Tin Plate and Chromium Coated Steel			
(Cleaning, pickling, plating & chemical rinse)	Suspended Solids	.2	.8
	Chromium, total dissolved	.009	.015
	Iron, dissolved	.015	.02
	Oil & Grease	.125	.25
	Tin	.09	.15
	Cyanide, Free	.01	.03
Coatings other than Tin & Chromium			
(Dip or Electrolytic)	Iron, dissolved	.02	.2
	Chromium, total dissolved	.0008	.008
	Zinc, total dissolved	.02	.2
	Cyanide, Free	.003	.03
	Suspended Solids	.25	2.5
	Oil & Grease	.17	2.4

Values are expressed in pounds per ton of product associated with the process:

Coke Manufacturing - lbs/ton dry coal
Iron Manufacturing - lbs/ton hot metal
Steel Manufacturing - lbs/ton liquid steel
Hot Forming - lbs/ton hot formed
Cold Finishing - lbs/ton processed

TEXTILES

APPLICABILITY

These instructions apply to Standard Industrial Classification Code 22, except 229.

For the purpose of this guidance the Textile Industry is defined as including the processing, finishing and manufacturing of cotton, wool, blends, and various synthetic textile goods.

SUBCATEGORIES CONSIDERED

Eight subcategories are considered: Wool scour and finish mills (integrated); Wool finish mills; Greige goods mills-woven and knitted goods; Finishing mills - woven products of cotton synthetics and blends; Finishing mills - knitted products of cotton, synthetics, and blends; Integrated woven goods mills (includes manufacture of greige goods); Integrated carpet mills; and yarn dyeing plants - all yarns.

OPERATIONS EXCLUDED

This guidance covers only the listed operations. Specifically excluded are SIC Code 229, "Miscellaneous Textile Goods," and also the basic manufacture of synthetic fibers, which are covered under guidance for the plastic/synthetics industry.

APPLICATIONS OF LIMITATIONS

The interim guidance will be updated to include COD values. Guidance for Categories I and II (wool scouring and finishing, respectively) should not be used pending additional performance data and economic impact analysis.

Pending analysis of recently complied study data, daily allowance pollutant loads will be calculated, using concentration values in tables A & B, and water use values established in accordance with the following procedure:

1. Compare water use data submitted by applicant with those shown herein for the particular process.

2. Meet with applicant and reach agreement as to the water use value appropriate for "loading" determination which incorporates good water conservation practices.

APPLICATION OF LIMITATIONS (continued)

3. If appropriate, secure a response from applicant as to why EPA water use values, which do incorporate water conservation practices, should not be used in determining allowable loads.

As part of the study referred to above, limitations for COD will be confirmed; therefore, this guideline does not include values for this parameter. The pH of final effluents shall be within the range 6.0 to 9.0, with no free hydroxyl alkalinity present. Oil and Grease should be limited, where applicable, at an effluent limitation based on 10 mg/l.

ABATEMENT MODELS

These unit operations may vary in hydraulic order and relative size and importance according to the needs of a specific textile mill. Nutrient addition may be necessary to maintain biological activity. Carbon treating facilities should be guarded against suspended solids and lint because of the possibility of plugging the carbon bed. Guard filters and/or backwashing provisions may be necessary.

Wool Processing: - Wastewater is characterized by brown color, high grease content and high alkalinity (pH 10). Treatment/control model is:

Solvent extraction of grease and suint
Screening
Dissolved air flotation
pH adjustment
Equalization
Chemical coagulation
Settling
Aerated lagoon

Cotton-Synthetics Integrated Mill: - Wastewater characteristics are high BOD, COD, and alkalinity, and possibly high color. Treatment/control model is:

Caustic recovery and reuse
Equalizing pond
pH adjustment
Bar and fine screens
Chemical coagulation and sedimentation
Carbon absorption
Biological oxidation

ABATEMENT MODELS (continued)

Carpet Integrated Mill: - Waste water characteristics may include high color, COD, temperature, latex emulsion and solvent content. Treatment/ control model is:

Equalization
Fine screening
Chemical coagulation and sedimentation
Carbon adsorption
Biological Oxidation

Because of the high temperatures associated with carpet processes, heat recovery from waste waters is recommended. Again, the treatment operations may vary in hydraulic order and importance depending on the needs of the specific carpet mill.

In-Plant Control

It is considered quite important that measures be taken to limit or control the discharge of dyestuff and waste caustic. For this reason, caustic recovery and reuse, where applicable, has been included in the treatment model. In addition, separate disposal or reuse of excess printing paste is recommended.

Supplementary process controls, the majority of which, for a single plant, represent feasible implementation measures, include the following:

> Improved control over wet process operations (e.g., redox measurement) to permit reduced excess chemical usage in sizing, desizing, bleaching, dyeing, finishing, etc.
>
> Improved water usage controls, to reduce water needs in processing, and to reduce water wastage via spills, leaks, and continuously running hoses.
>
> Improved housekeeping, use of retaining sills, splash boards, special waste collection containers, etc.

For the waste resulting from printing operations, excess pastes should be separated from the print room wastewaters and the pastes collected manually or automatically into barrels or other suitable containers. These pastes should not be allowed to enter floor drains in the print rooms or the screen cleaning/repair rooms. The viscous printing pastes clog drain lines, sewers, and treatment works appurtenances, and further settle out on the sides of aerated basins and in other areas where least desired. Print pastes may exhibit considerable toxicity but conversely, certain pastes have extremely high BOD's from 200,000 mg/l to more than 400,000 mg/l. The collected mass should be incinerated with strict caution in

ABATEMENT MODELS (continued)

preventing air pollution; or should be partially refined of varsol and other hydrocarbons or possibly recovered.

For wool processing, recovery of wool grease and suint are essential in achieving effluent limits. Recovery of wool greases by solvent systems and conversion into lanolin was practiced when the lanolin market was favorable. Calcium chloride cracking or acid cracking are possible alternatives. Solvent systems with recovery of the solvents can reduce scour waste loads by 96-97.

Substantial waste reduction can be effected by recovery of caustic solution by means of dialysis, filtration, and multiple-stage evaporation. Countercurrent washing and rinsing following scouring and mercerizing are feasible. A number of textile mills are currently practicing evaporation and reuse of mercerizing solutions with various forms of contercurrent washing. When a cotton finishing plant does not recover mercerizing wastes, significant problems may arise due to high hydroxyl alkalinity in the plant wastes; combined plant wastes will exhibit pH levels of 11.0-13.0 which could seriously affect ensuing biological treatment, and such wastes will likely require neutralization before final discharge. With recovery of mercerizing solution, caustic purchases may be reduced more than 50 percent resulting in significant cost savings to a textile mill.

Treatment Comments and Alternatives:

Disposal of spent cooling waters, evaporator condensates, air conditioning waters, and cooling tower blowdown constitute additional pollution problems in textile mills. Air conditioning systems which use scrubbers for incoming air will contain lint, oils, and extraneous contaminants. Cooling tower blowdown and spent cooling waters will probably contain chromates, phosphates, or other rust inhibitors, and probably fungicides and biocides, e.g., chlorophenates, thiocyanates, and bromopropionates. Most of these materials are extremely toxic to the aquatic environment and their discharge may be critical. Chromates can be eliminated by the use of sulfate salts in chemical treatment, by calcium bisulfite, or other means. Evaporators within textile mills warrant very close attention to ensure minimum entrainment of solids in the condensates; caustic soda evaporators represent a high potential waste source.

Extensive equalization/balancing facilities will be required for smoothing out the abrupt changes and highly-variable characteristics of the raw wastewaters generated by textile mills prior to entering the treatment works. Physical-chemical treatment units are generally less vulnerable to random fluctuations than biological treatment units, but, nevertheless, flow equalization will serve to promote most efficient treatment. Storage/equalization/automatic control of final discharges to the receiving stream may likewise be found necessary to satisfactorily comply with effluent limits. A separate collection system for "strong" wastewaters, including dyes, detergents, and finishing agents is desirable to prevent shock

ABATEMENT MODELS (continued)

loading of colorants and toxics to treatment systems. It would also lend itself to special handling and treatment of "strong" wastewaters in the future.

Fine mesh screening of plant wastewaters to remove lint and extraneous fibers can be incorporated into some textile mills. Natural and synthetic fibers, if not removed from wastewaters, may comprise up to 10 percent of the weight of biological sludges. Lint and fibers cause troublesome treatment problems and may be released to the receiving stream. Efficient removal of lint and fibers by means of 40-80 mesh screens (or equivalent) serves to significantly reduce suspended and total solids, and BOD and COD loads in the generated wastewaters, and will substantially lessen the color bodies passed on through succeeding treatment facilities. Screening is considered necessary for protecting trickling filtration, carbon adsorption, reverse osmosis and other forms of waste treatment. Solids are disposed of via sanitary landfill, incinerated, or possibly converted into useful by-products.

EFFLUENT LIMITATIONS

(Pounds of Pollutant Per 1000 Pounds of Product)
Level A

Mill Type*	Product	Gals/lb	BOD_5	TSS	Crt	Cr^{+6}	Phenolics	Sulfide
I	Fin. Wool	35	8	8	.07	.0015	.07	.15
II	Fin. Wool	25	6	6	.05	.0010	.05	.10
III	Greige Goods	5	1.5	2	.01	.0002	.01	.02
IV	Fin. Cloth	16	6	6	.03	.0007	.03	.06
V	Fin. Cloth	11	4	5	.02	.0005	.02	.04
VI	Fin. Cloth	20	7	7	.04	.0008	.04	.08
VII	Pri. Backed Carpet	22	6	6	.05	.0009	.05	.09
VIII	Yarn	18	2.5	2.5	.04	.0008	.04	.08

*As defined under "Subcategories considered".

NOTE: Fecal coliform are not to exceed 1000 organisms per 100 ml in the various effluents when sanitary sewage is present in the system.

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Effluent Limitations
(Milligrams of Pollutant Per Liter of Water Discharged)

Level A

Mill Type*	Product	Gals/lb	BOD_5	TSS	Cr^t	Cr^{+6}	Phenolics	Sulfide
I	Fin. Wool	35	27	27	.25	.005	.25	.5
II	Fin. Wool	25	29	29	.25	.005	.25	.5
III	Greige Goods	5	36	48	.25	.005	.25	.5
IV	Fin. Cloth	16	45	45	.25	.005	.25	.5
V	Fin. Cloth	11	44	54	.25	.005	.25	.5
VI	Fin. Cloth	20	42	42	.25	.005	.25	.5
VII	Pri. Backed Carpet	22	33	33	.25	.005	.25	.5
VIII	Yarn	18	17	17	.25	.005	.25	.5

*As defined under "subcategories considered".

EFFLUENT LIMITATIONS

(Pounds of Pollutants Per 1000 Pounds of Product)

Level B

Mill Type*	Product	Gals/lb	BOD_5	TSS	Cr^t	Cr^{+6}	Phenolics	Sulfide
I	Fin. Wool	35	20	10	.07	.0015	.07	.15
II	Fin. Wool	25	15	8	.05	.0010	.05	.10
III	Greige Goods	5	3	3	.01	.0002	.01	.02
IV	Fin. Cloth	16	8	8	.03	.0007	.03	.06
V	Fin. Cloth	11	5	6	.02	.0005	.02	.04
VI	Fin. Cloth	20	8	9	.04	.0008	.04	.08
VII	Pri. Backed Carpet	22	8	8	.05	.0009	.05	.09
VIII	Yarn	18	4	4	.04	.0008	.04	.08

* As defined under "Subcategories considered".

NOTE: Fecal coliform are not to exceed 1000 organisms per 100 ml in the various effluents when sanitary sewage is present in the systems.

EFFLUENT LIMITATIONS

(Milligrams of Pollutant Per Liter of Water Discharged)

Level B

Mill Type*	Product	Gals/lb	BOD_5	TSS	Cr^t	Cr^{+6}	Phenolics	Sulfide
I	Fin. Wool	35	68	34	.25	.005	.25	.5
II	Fin. Wool	25	72	38	.25	.005	.25	.5
III	Greige Goods	5	72	72	.25	.005	.25	.5
IV	Fin. Cloth	16	60	60	.25	.005	.25	.5
V	Fin. Cloth	11	54	65	.25	.005	.25	.5
VI	Fin. Cloth	20	47	53	.25	.005	.25	.5
VII	Pri. Backed Carpet	22	43	43	.25	.005	.25	.5
VIII	Yarn	18	27	27	.25	.005	.25	.5

*As defined under "Subcategories Considered"

INSULATION FIBERGLASS

APPLICABILITY

These instructions apply to Standard Industrial Classification Code 3296.

SUBCATEGORIES CONSIDERED

This guidance applies only to insulation fiberglass, (mineral wool).

OPERATIONS EXCLUDED

Effluents from the textile (SIC 3329) and reinforced fiberglass industries are excluded from discussion in this guideline.

APPLICATION OF LIMITATIONS

The guidance applies to process wastewater only.

EFFLUENT LIMITATIONS

By July 1, 1977, all fiber glass insulation manufacturing plants should have total recycling of all waste streams.

No waterborne waste discharge shall be permitted from the manufacturing process. The only exception to this closed cycle requirement shall be discharge to a municipal sewage treatment plant with acceptable secondary or higher treatment and the capability to handle the process load.

Sludge from closed cycle treatment systems shall be disposed of in such a manner as to prevent entry into navigable waters or their tributaries.

ABATEMENT MODELS

In a typical closed system the chain-cleaning (phenolic) wastes, cooling water blowdown, cullet water wastes (if raw glass is also manufactured), overspray water, and miscellaneous machinery and floor-cleaning wastes are all put through the same system. The system may consist of several or all of the following: bulk fiber screening, primary filtration, equalization, flocculation, diatomite filtration and sludge removal. Diatomite filtration may be replaced by flocculation and settling (clarification) in some cases. The processed water is recirculated as wash water overspray and binder mix water. Makeup water is added to account for evaporative losses in the overspray and binder. The dissolved solids accumulation is mainly exited via the product in the binder. Sludge from the treatment process is landfilled.

ABATEMENT MODELS (continued)

Special treatment problems may result from operations which use a changing variety of binder compounds, and from operations which apply oils to the mat. However, these are not unsolvable problems.

The elimination of the "chain" cleaning phenolic process waste can be achieved by reuse of the "chain" cleaning water to provide the water source for process needs. With the adoption of 1000 psi, low volume, spray cleaning to replace the mandrel cleaning operation, the elimination of the need for caustic for "chain" cleaning is expected. One of the most significant problems from the combined treatment of all waste is the foaming caused by the introduction of caustic into the wastewater treatment system for the mandrel cleaning operation.

The other waste discharges which must be treated included domestic wastes, boiler and cooling tower blowdown, softener backwash, and storm water run off. With the exception of storm water, these wastes can be routed to municipal treatment systems. If a tie-in to the municipal system cannot be made, a closed system treating all these wastes can be installed. The typical closed system would probably include screening, primay filtration, coagulation, flocculation, sedimentation, diatromite filtration, and sludge removal.

In addition, good in-plant control must be practiced to minimize water usage and to maintain the lowest possible waste levels to achieve the highest efficiency and lessen problems in water recirculation.

Process control which may be needed to meet the "no discharge" requirement is as follows:

1. Minimization of volume of chain-cleaning water by utilization of high pressure in lieu of volume. This 1000 psi spray will also replace the mandrel cleaning operation thereby eliminating caustic waste water.
2. Careful adjustment of minimization of the variety of binder resins and lubricants to reduce the potential for upsets in the treatment system.
3. Use of recirculated water in resin mix to the extent necessary to control buildup of dissolved solids in the treatment system. Blowdown should go into the product. The dissolved solids, however, should not accumulate in the system, because they remain with the product on evaporation of excess water in curing ovens.
4. Use of lubricants and sizing compatible with treatment systems.
5. Good housekeeping practices to minimize the need for washdown of machinery and floors and the minimization of water usage for such purposes.